

MONTHLY WEATHER REVIEW.

VOL. XI.

WASHINGTON, D. C., MARCH, 1883.

No. 3.

INTRODUCTION.

This REVIEW shows the general meteorological conditions which prevailed over the United States during the month of March, 1883, as indicated by the reports received from the regular and voluntary observers of the Signal Service, up to April 20th, 1883. A brief description is also given of the storms which occurred in the north Atlantic during the month, as based upon observations taken at 7 a. m., Washington time.

The special features of the month are:—

1st. The continuation of the floods which began in the lower Mississippi valley during February.

2d. The low mean temperature over the districts east of the Missouri and lower Mississippi rivers, averaging from 1°.3 in Florida to 6°.5 in the lower lake region below the mean of the month.

3d. The large deficiency in the rainfall over the country from the upper Mississippi valley to the Atlantic coast, and the excessive rainfalls which occurred in California during the latter part of the month, terminating the serious drought which prevailed in that state.

4th. Chart ii. shows the limits within which icebergs have been observed in the north Atlantic during the month. The southern limit is now on the forty-first parallel of latitude, and the eastern limit is shown near the forty-fifth meridian.

In the preparation of this REVIEW the following data received up to April 20th, have been used; viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-six Signal Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and eighty-eight monthly journals, and one hundred and seventy-eight monthly means from the former, and fifteen monthly means from the latter; two hundred and forty-five monthly registers from voluntary observers; fifty-eight monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather-reports from the local weather services of Indiana, Kansas, Nebraska, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The distribution of mean atmospheric pressure for the month of March, 1883, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines in red on chart iii.

The mean pressure of the month is greatest over northern Montana and northwestern Dakota, where it is above 30.2. The isobar of 30.15 incloses a region between the ninety-fifth and one hundred and fifteenth meridians north of parallel

forty. From the area of greatest pressure southwestward the monthly means diminish over central California to 30.01 at Visalia and 30.02 at Sacramento, but they increase at the coast stations to 30.05 at San Francisco and San Diego, and 30.08 at Los Angeles. Over the southern sections of the country the mean pressure is above 30.05, except at stations in the southern parts of Arizona, Texas, and Florida. The pressure is least over the Canadian Maritime Provinces, the lowest monthly mean, 29.78, being reported from Charlottetown, Prince Edward Island.

Compared with February, the mean pressure shows a general decrease at all stations varying from 0.02 to 0.32. The deficiencies are greatest in the northern plateau and on the Atlantic coast north of the fortieth parallel; they are least in Arizona, Nevada, and southern California. There is an average decrease of about 0.2 from the lake region and upper Mississippi valley to the south Atlantic and Gulf states.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

The pressure is below the normal on the Pacific coast, over the northern part of the upper lake region, in New England, Florida, and along the south Atlantic and east Gulf coasts. In these districts the departures vary from 0.01 to 0.08, and are greatest on the Pacific coast. In the other districts the mean pressure is from normal to 0.14 above, the greatest departures occurring at stations in the extreme northwest and in the northern slope. From the middle Atlantic coast to the Missouri valley the departures are from normal to 0.08 above.

BAROMETRIC RANGES.

The monthly barometric ranges have been greatest in New England, the upper lake region and the extreme northwest; they have been least in New Mexico, Arizona, and southern California.

The following are the greatest monthly ranges reported: Eastport, Maine, 1.65; Newport, Rhode Island, 1.59; Block Island, Rhode Island, 1.58; Portland, Maine, 1.56; Duluth, Minnesota, 1.55; Provincetown, Massachusetts, 1.54; Saint Vincent, Minnesota, 1.53; New London, Connecticut, 1.48; Marquette, Michigan, 1.46; Escanaba, Michigan, 1.38; Mackinaw City, Michigan, and Delaware Breakwater, Delaware, 1.36; Moorhead, Minnesota, 1.35; New Haven, Connecticut, Barnegat City, New Jersey, and Huron Dakota, 1.34; Yankton, Dakota, 1.32; Albany, New York, 1.30. The smallest monthly ranges are: San Diego, California, 0.28; Los Angeles, California, 0.33; Tucson, Arizona, 0.36; Yuma, Arizona, 0.40; Fort Grant, Arizona, 0.41; Visalia, California, 0.44; Prescott, Arizona, 0.45; Silver City, New Mexico, 0.49; Camp Thomas and Fort Apache, Arizona, 0.52; El Paso, Texas, and Red Bluff, California, 0.56; Eagle Rock, Idaho, 0.59.

In the several districts the monthly ranges have varied as follows:

New England.—From 0.94 on the summit of Mount Washington, New Hampshire, to 1.65 at Eastport, Maine.

Middle Atlantic States.—From 1.00 at Lynchburg, Virginia, to 1.36 at Delaware Breakwater, Delaware.

South Atlantic States.—From 0.79 at Atlanta, Georgia, to 1.10 at Kittyhawk, North Carolina.

Florida peninsula.—From 0.55 at Key West, to 0.81 at Cedar Keys.

Eastern gulf.—From 0.81 at Starkville, Mississippi, to 0.91 at New Orleans, Louisiana.

Western gulf.—From 0.75 at San Antonio, Texas, to 0.98 at Denison, Texas, and Port Eads, Louisiana.

Rio Grande valley.—From 0.78 at Brownsville, Texas, to 0.79 at Eagle Pass, Texas.

Ohio valley and Tennessee.—From 0.81 at Knoxville, Tennessee, to 1.13 at Morgantown, West Virginia.

Lower lakes.—From 1.06 at Toledo, Ohio, to 1.23 at Oswego and Rochester, New York.

Upper lakes.—From 1.05 at Chicago, Illinois, to 1.55 at Duluth, Minnesota.

Extreme northwest.—From 1.21 at Fort Buford, Dakota, to 1.53 at Saint Vincent, Minnesota.

Upper Mississippi valley.—From 1.01 at Cairo, Illinois, to 1.26 at Saint Paul, Minnesota.

Missouri valley.—From 1.18 at Leavenworth, Kansas, to 1.34 at Huron, Dakota.

Northern slope.—From 0.89 at Fort Maginnis, Montana, to 1.17 at Fort Keogh and Poplar River, Montana.

Middle slope.—From 0.65 on the summit of Pike's Peak, Colorado, to 0.98 at West Las Animas, Colorado.

Southern slope.—From 0.62 at Fort Davis, Texas, to 0.87 at Henrietta, Texas.

Southern plateau.—From 0.36 at Tucson, Arizona, to 0.70 at Santa Fé, New Mexico.

Middle plateau.—From 0.65 at Pioche, Nevada, to 0.70 at Salt Lake City, Utah.

Northern plateau.—From 0.59 at Eagle Rock, Idaho, to 0.98 at Lewiston, Idaho.

North Pacific coast.—From 0.99 at Roseburg, Oregon, to 1.09 at Olympia, Washington Territory.

Middle Pacific coast.—From 0.56 at Red Bluff, California, to 0.83 at Cape Mendocino, California.

South Pacific coast.—From 0.28 at San Diego, California, to 0.44 at Visalia, California.

AREAS OF HIGH BAROMETER.

Five areas of high barometer have been sufficiently marked to merit description.

I.—On the 1st, the pressure was high in the territories of the northwestern frontier, the isobar of 30.4 extending from Dakota on the east to Washington Territory on the west and New Mexico on the south. On the 2d, the following remarkably high pressures were observed: Yankton, Huron and Fort Bennett, 30.8, or above the normal respectively 0.63, 0.68, and 0.67 inch. The isobar of 30.7 included all of Nebraska and portions of Dakota, Wyoming, Colorado, Kansas, and Iowa. On the 3d, the pressure in the United States east of the Sierra Nevada mountains averaged from 0.3 to 0.4 inch above the mean for the month, the region of highest barometer extending from Manitoba to the east Gulf states; but at the last observation of the day there were two distinct centres of high area, one in the southwest included in the isobar of 30.4, and the other in Manitoba included in the isobar of 30.5. On the 4th, the high area in the southwest ceased to exist as an important meteorological element, but at the morning observation in Manitoba, pressures exceeding 30.7 inches were reported; during the day the centre of high area was rapidly transferred to the lower lake region. On the 5th, the high barometer extended over the middle states and New England. On the 6th, it was central in the Maritime Provinces of Canada and Nova Scotia, where pressures from 0.6 to 0.7 inch above the mean for the month were observed. Although the barometers at the centre of this high area were in general the highest observed during the month, the temperatures reported were not as low as might have been anticipated.

II. At the midnight observation of the 5th there was a remarkable increase of pressure in Idaho and Montana. On the 6th, the centre of high area, enclosed in the isobar of 30.6, moved in an easterly track into Manitoba. On the 7th, its centre was transferred to southern Michigan. On the 8th, the high area, rapidly diminishing in pressure at its centre, moved

over the middle states. In connection with this high area, a cold wave or "norther" was noted on the 6th in Montana and Dakota, extending during the day over the Missouri valley, Nebraska and Colorado. On the 7th, the "norther" moved over the Gulf states; the temperature at several stations falling more than 30° in twenty-four hours. Cautionary off-shore signals, displayed on the coast of Texas for a "norther," were justified by the following maximum velocities: Indianola, 54, n., Galveston, 43 ne. The minimum temperatures for the month were generally associated with this high-pressure in the northwest, lake region, middle states, and New England.

III. On the 8th, there was a sharp rise of pressure in Washington Territory, which, on the 9th, extended over Idaho and Montana. On the 10th, the pressure was highest in the upper Missouri valley. On the 11th, the high area began to move in a southerly track and became central in Kansas and Missouri. On the 12th, the high barometer was transferred to the south Atlantic and Gulf states, and, on the 13th, ceased to exist as a high area.

IV. For the twenty-four hours following the 3 p. m. observation of the 17th there was a very remarkable rise of pressure in the northwest and upper lake region in the rear of low area vi., the rise at Duluth being 1.17 inches. In Manitoba the temperature fell to nearly 30° below zero and at exposed points Minnesota to 20° below zero; in Minnesota and Dakota at some of the signal stations the temperature fell in twenty-four hours from fifty to sixty degrees. During the 18th, the high-pressure became central in Minnesota. On the 19th, the high area was transferred to Texas. This high-pressure produced a "norther" on the coast of Texas, but very low temperatures were not observed in that state, although the minimum temperatures of the month in the region extending from Wyoming and Nebraska to the Gulf of Mexico are associated with this high barometer.

V. On the 24th, there was a sharp rise in pressure exceeding 0.5 inch in the northern portion of Dakota and Montana. On the 25th, the high area moved into Manitoba and Minnesota. On the 26th, 27th, and 28th, its centre remained nearly stationary, but the high barometer, yielding in pressure in advance of a depression on the Pacific coast, ceased to exist as an important weather element.

AREAS OF LOW BAROMETER.

Eleven areas of low barometer have been charted for the month of March, none of which originated west of the Rocky mountains. Numbers i., iii., v., vi. and viii., first appeared in British America, north of Minnesota and Dakota, and with the exception of number viii., they pursued a general easterly movement. Numbers i., v. and vi. passed eastward over Canada, and the centres were at no time located within the limits of the United States. Number ii. appeared in the extreme northwest, moved eastward, and in New England united with number iv., which first appeared on the south Atlantic coast. Numbers vii., x. and xi. first originated in the southwest, and pursued northeasterly courses, disappearing off the Atlantic coast.

To show the number of areas of low-pressure which have occurred during the month of March since 1874, the following table has been prepared:

Month.	Year.	Number.	Month.	Year.	Number.
March.....	1874	12	March.....	1879	18
Do.....	1875	11	Do.....	1880	16
Do.....	1876	8	Do.....	1881	10
Do.....	1877	12	Do.....	1882	10
Do.....	1878	17	Do.....	1883	11

The following table shows the latitude and longitude in which each depression was first and last observed, and the hourly velocity of each depression within the limits of the stations of observation:

Areas of low barometer.	FIRST OBSERVED.		LAST OBSERVED.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.	0 00	95 00	0 00	62 00	54.7
II.	47 15	101 00	46 30	62 00	36.8
III.	50 30	100 30	50 00	61 00	33.4
IV.	33 00	78 30	50 00	61 00	40.0
V.	50 30	94 30	48 15	60 00	30.4
VI.	50 45	96 15	50 45	58 15	45.5
VII.	35 00	93 00	46 45	60 00	25.3
VIII.	50 15	96 45	38 00	78 30	33.2
IX.	30 30	84 30	35 30	74 30	22.1
X.	32 30	101 00	37 30	75 15	48.1
XI.	29 45	101 30	34 45	80 30	48.4
Mean hourly velocity.....					38.0

I.—At the morning observation of the 1st a depression of slight energy was noted in Manitoba; during the day it moved over the lake region, but was not accompanied by precipitation. Brisk to high winds were reported from several of the lake ports. On the 2d, the centre of depression moved along the Saint Lawrence valley and beyond the coast. In connection with this low-area the maximum temperatures of the month occurred at Milwaukee, Erie and Buffalo, and at the most northerly stations in the upper lake region.

II.—On the 5th, a depression, developing in Dakota, moved into Minnesota. On the 6th, the low area, exhibiting a great increase in storm energy, pursued an easterly track over the lake region, and rain or snow was reported from all the states east of the Mississippi. On the 7th, the storm-centre moved over New England and beyond the limits of the land stations. Cautionary signals displayed for this storm were justified by maximum velocities, as follows: Grand Haven, 40 nw.; Milwaukee, 31 nw.; Hatteras, 44 sw.; Kittyhawk, 39 se.; Cape Henry, 28 sw.; Chincoteague, 42 n.; Delaware Breakwater, 36 sw.; Cape May, 28 sw.; New York, 29 w.; New London 26 se.; Block Island, 40 n.; Newport, 37 nw.; Provincetown, 40 se.; Boston, 26 e.; Thatcher's Island, 28 se.; Portland, Maine, 30 se.; Eastport, 42 e. Cautionary signals were changed on the middle Atlantic coast to cautionary off-shore signals, and the following maximum velocities were reported: Chincoteague, 42 n.; Delaware Breakwater, 40 nw.; Cape May, 48 nw.; Atlantic City, 32 nw.; Barnegat, 44 nw., and Sandy Hook, 44 nw.

III.—At the midnight observation of the 8th a depression, which had been moving in a southeasterly track down the Saskatchewan valley became central in Manitoba. On the 9th, it continued its course over the Lake Superior region, and during the day exhibited a considerable development of energy. On the 10th, it became merged in low area iv., which was moving in a northeasterly path along the coast. Cautionary signals displayed for this storm on Lake Michigan were justified by the following maximum velocities: Grand Haven, 32 s.; Milwaukee, 32 n. The storm effects of this depression, after it had passed the lake region will be considered in connection with low area iv.

IV.—At the midnight report of the 9th, the pressure on the North Carolina coast had fallen in eight hours 0.4 of an inch, with a shift of winds indicating the approach of a storm from the sea. On the 10th, the storm-centre, with a great development of energy, moved along the line of the coast, becoming at midnight merged into low area iii., as has been stated. The following very low-pressures were reported during the progress of the storm: Eastport and Block Island, 28.92 inches; Provincetown, 28.95, or nearly one inch below the normal. Very heavy rain or snow accompanied this depression. On the 11th, the storm-centre, showing considerable diminution in violence, moved beyond the Gulf of Saint Lawrence. Cautionary signals displayed for this storm were justified as follows: Smithville, 28 se.; Wilmington, 25 s.; Macon, 28 sw.; Hatteras, 48 sw.; Kittyhawk, 36 nw.; Cape Henry, 32 e.; Chincoteague, 29 nw.; Delaware Breakwater, 44 e.; Cape May 39 ne.; Atlantic City, 32 ne.; Barnegat City, 44 w.; Sandy Hook, 40 ne.; New York, 32 ne.; New Haven, 38 ne.; New London, 26 nw.; Block

Island, 55 ne.; Newport, 36 sw.; Provincetown, 32 se.; Boston, 36 ne.; Thatcher's Island, 44 ne.; Portland, Maine, 32 ne.; Eastport, 42 e. Cautionary signals were changed to off-shore from Cape Cod to Macon, North Carolina, and were generally justified. The highest off-shore velocity was at Cape May, 56 w.

V.—On the 13th, a slight depression moved over Manitoba into the lake Superior region. On the 14th, it contained its easterly track north of the lake region and showed a considerable development of storm energy, especially in its south and west quadrants. On the 15th, the low area pursued its easterly course beyond the Maritime Provinces of Canada. The pressures this day in the centre of the low area were generally 0.7 of an inch below the mean for the month. The precipitation accompanying this storm was not abundant, and generally occurred after the veering of the winds to northwest. Cautionary northwest signals were displayed on Lake Michigan, and the following high winds were reported: Milwaukee, 36, nw.; Grand Haven, 29, nw. Cautionary off-shore signals displayed on the Atlantic coasts for this storm were justified by the following maximum velocities: Portland, Maine, 28, w.; Thatcher's Island, 37, nw.; Newport, 28, nw.; Block Island, 37, n.; New London, 25, nw.; Sandy Hook, 44, nw.; Cape May, 42, nw.; Delaware Breakwater, 47, nw.; Chincoteague, 45, nw.; Cape Henry, 52, nw.; Kittyhawk, 60, n.; Hatteras, 52, n.

VI.—On the 17th, a storm-centre exhibiting considerable energy moved in an easterly track north of the lake region. The lowest pressure reported was at Duluth, 29.08, or 1.03 below the normal. On the 18th, with diminished energy, the depression was transferred beyond the mouth of the Saint Lawrence. The precipitation accompanying this storm was not heavy, and generally occurred, as in the previous storm, after the shift of the winds to the northwest. Cautionary signals displayed for this storm were justified by maximum velocities, as follows: Grand Haven, 31, n.; Milwaukee, 43, ne.; Eastport, 36, s.; Portland, 26, s.; Thatcher's Island, 28, sw.; Boston, 30, e.; Provincetown, 28, s.; Newport, 25, se; Block Island, 33, sw.; New York, 25, sw.; Sandy Hook, 42, sw.; Barnegat, 46, nw.; Chincoteague, 30, s.; Delaware Breakwater, 45, s.; Cape May, 32, s.; Atlantic City, 32, s.

VII.—This appears to have been a secondary development of the low area just described. The pressure being below the mean for the month in the southern states after the passage of low area vi., there was formed by the high pressure on the south Atlantic coast and the rising pressure in the northwest and lake region, a long barometric depression extending from Texas to Maine, but at the last observation of the 18th, a well-defined centre of low area was located in Arkansas. On the 19th, the storm-centre increasing in energy moved into the middle states, and on the 20th and 21st, pursued its track along the coast of New England and Nova Scotia. General precipitation accompanied this depression in all the states east of the Mississippi river. The cautionary signals displayed for low area number vi., were continued for this storm, and the maximum velocities have been previously stated in the description of that depression. The maximum temperatures of the month from the Indian Territory and northern Texas northeastward to the lower lake region and southern New England, occurred in connection with this low area.

VIII.—On the 22d, a depression moved from Manitoba in a track slightly to the south of east over the Lake Superior region. On the 23d, it travelled to the southeast, becoming central at the afternoon report in Virginia. No dangerous winds were reported, and it is only remarkable for the somewhat anomalous track of the centre of this low area.

IX.—On the 24th, the pressure was quite low in the Gulf states and the Gulf of Mexico, but not until the afternoon of the 25th was a well defined centre of depression noted. The storm had then taken a northeasterly track and, exhibiting a constantly increasing development in energy, moved along the south Atlantic coast. Cautionary signals displayed for this

storm were justified, as follows: Savannah, 28, e.; Smithville, 28, ne.; Wilmington, 25, e.; Macon, 44 ne.; Hatteras, 60, ne.; Kittyhawk, 56, ne.; Cape Henry, 36 nw.; Chincoteague, 28 ne.; Cape May, 32 nw.; Barnegat, 26 ne.

X.—On the 27th and 28th, the pressure remained low in Texas. On the 29th, the low area moved, with only a slight increase in energy, into western Tennessee. On the 30th, it was transferred in an easterly track beyond the coast, and at no point of its path did it manifest any storm violence. In connection with this low area the maximum temperatures of the month occurred at stations in southern and eastern Texas, Mississippi, Tennessee and North Carolina.

XI.—This was a secondary development of the depression just described as x., and the track of the centre of the storm-area is charted slightly to the south of x. This depression was accompanied by quite heavy rains and by general thunderstorms. It exhibited decided storm energy only on the North Carolina coast, where cautionary signals were displayed and justified by the following maximum velocities: Hatteras, 40 ne.; Kittyhawk, 48 ne.; Cape Henry, 38 ne. The maximum temperature of the month along the Gulf and south Atlantic coasts are associated with this low area.

NORTH ATLANTIC STORMS DURING MARCH, 1883.

[Pressure expressed in inches and in millimeters; wind-force by scale of 0—10.]

Chart ii. exhibits the tracks of the principal depressions that have moved over the north Atlantic ocean during March, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic, and from other miscellaneous data received at this office up to April 21st. The observations used are, in general, simultaneous, being taken each day at 7 h. 0 m. a. m., Washington, or 0 h. 8 m. p. m., Greenwich mean time.

Seven depressions are charted, but only three of these, namely, iv., v. and vi., appear to have reached the European coasts. Number v. apparently separated when near the twenty-second meridian, one part moving northeastward and the other taking an east-southeasterly direction toward the Bay of Biscay. Number vii., after leaving the coast of the United States, appears to have pursued a course somewhat south of the usual track. The eastward movement of the depressions numbered i., ii. and iii. was checked by the presence of an area of barometric maxima which prevailed over the ocean during the first half of the month and extended from Europe westward to the forty-fifth meridian, the depressions apparently filling up near the edge of the high area. None of the depressions charted have displayed unusual storm-energy; on the contrary, the weather has been much less stormy than is usual during the month of March. In consequence of the area of high-pressure above referred to, easterly and southeasterly winds prevailed during the greater part of the month, and were consequently favorable to vessels bound to the westward.

The following descriptions relate to the storms traced on the chart:—

I.—At the close of February a slight depression occupied the Atlantic near N. 45°, and between W. 40° and 50°. By March 1st, the pressure had decreased and the disturbance exhibited considerable energy as indicated by the following report of Captain Berry, of the s. s. "Périère." At 5 a. m., the barometer began to fall rapidly and at 9 a. m. (in N. 43° 30', W. 47° 09'), the wind hauled to se. and freshened; at 3 p. m. the wind blew in squalls; 4:45 p. m. the storm was at its height, with furious sea running. From 5:30 p. m. to 6 p. m., in the vicinity of the centre, thunder, lightning, hail and higher temperature, with thunder squalls from the nw. and wind from the sw. At the centre, the barometer, after having risen quickly about .15 of an inch, again fell correspondingly and the wind shifted from w. to sw., with very heavy sea from the southward; at 9 p. m. the wind gradually hauled to nw., the barometer began to rise and the gale moderated. The lowest barometric reading during the storm was 29.21, (742.0)." By the 2d, the centre of

disturbance had moved northeastward to about N. 51°, W. 37°; on that day the ship "Festina Lente," in N. 52 16', W. 35 0', reported barometer 29.35 (745.5), wind s. by w., force 10; vessels to the southward of N. 50°, experienced strong westerly gales with snow, while vessels to the east of the centre had moderate southerly gales. By the morning of the 3rd, the disturbance had moved beyond the range of the observations and a great increase of pressure set in over the ocean south of the fiftieth parallel and between W. 30° and 45°, where clearing weather with moderate breezes generally prevailed.

II.—This is probably a continuation of low area i. of chart i. of this REVIEW. On the 2d, the disturbance passed on to the Atlantic from the coast of Nova Scotia, and during the 3d and 4th, the circulation of the winds near the fiftieth meridian, indicated that the centre of disturbance was to the westward of that meridian. On these dates, moderate to strong southerly gales prevailed to the eastward of the storm-centre, while to the westward moderate breezes were reported. By the morning of the 5th, the disturbance had passed to about N. 45°, W. 45°, the barometric pressure near the centre, ranging from 2.69 (751.8) to 29.8 (756.9). An area of high-pressure was situated near W. 40° and extended eastward to the British Isles, in consequence, high easterly and southeasterly winds prevailed near the forty-fifth meridian; the gradients had also increased in the western quadrants, where the northwesterly winds increased in force. Captain Meyer, of the bark "Orpheus," reported as follows: "5th, near N. 45° 33', W. 43° 12', barometer 29.65 (753.1), fresh sse. gale with high cross sea; at 4 p. m. the wind gradually increased until midnight when it blew a whole gale with heavy rain. At 4.30 p. m. of the 5th, the wind shifted to south and southwest and continued to blow with undiminished force." On the 4th, 5th and 6th, the s. s. "Republic," between N. 42° 18', W. 52° 03' and N. 45° 00' W. 40° 00', had strong ssw. to ne. and sse. gales, with black and rainy weather, lowest barometer 29.5 (749.3). The s. s. "Lord Gough" in N. 45° 30' W. 41° 25', also reported: 12.30 p. m., heavy rain, wind shifting from se. to sw., force 8, barometer 29.58 (751.3). At midnight of the 6th, the winds changed to northwesterly and by morning of the 7th, the depression had entirely disappeared, and the area of high-pressure had advanced westward to the sixtieth meridian.

III.—This is a continuation of low area ii. of chart i. The disturbance passed over the Maritime Provinces to the Atlantic during the 7th, and, on the 8th, it was apparently central near N. 42, W. 52°. On the 7th, the s. s. "Weser," in N. 39° 14', W. 62° 13', reported a heavy sw. by s. gale with long cross sea, lowest barometric reading 29.49 (749.0) at 8 p. m.; on the 8th the s. s. "Lord Gough," reported a sudden shift of wind from s. to nw., force 8, barometer 29.65 (753.1). On the 9th the centre of disturbance, moving northeastward, was shown near N. 45°, W. 38°, the pressure having increased while the barometric gradients had decreased in the eastern quadrants, so that only moderate to fresh breezes were generally reported by vessels within the area of disturbance. By the morning of the 10th a considerable increase of pressure appears to have set in over the ocean between W. 40° and W. 50°, and the northwesterly winds increased to moderate gales. This depression disappeared during the day near W. 37°.

IV.—This was probably a secondary development of low areas iii. and iv. of chart i., which are described elsewhere in this REVIEW. During the passage of low area iv. along the coast of the United States, strong southerly gales were reported on the 10th by vessels to the westward of the sixteenth meridian and between N. 30° and N. 40°. On the 11th, the pressure decreased near the Banks of Newfoundland, and, on the 12th, the shifting of the winds indicated that the disturbance was near the eastern edge of the Banks. On that day the winds were moderate to fresh and continued so, during the 13th, as the depression moved northeastward, and the pressure increased but slowly in rear of the disturbance. During the 14th, 15th, and 16th the barometer remained low over the ocean between the forty-fifth and fifty-fifth parallels of latitude and the thirty-

fifth and twenty-fifth meridians, the decrease extending to the British Isles. Vessels within the region just mentioned reported moderate to strong breezes mostly from the west. By the 17th, the disturbance was near the British coasts, but the marine reports, at hand, do not indicate that it exhibited any great storm energy.

V.—This depression was probably closely connected with low area v. of chart i. When that depression was central over the Maritime Provinces, strong northerly gales occurred over the Atlantic from the seventieth meridian westward to the coast of the United States, and on the 16th, the centre of disturbance was apparently situated to the south of Newfoundland. The ship "Cornelius," reported on the 16th, in N. 43° 18', W. 57° 29', barometer 29.45 (748.0), calm; s.s. "City of Berlin," in N. 41° 37', W. 60° 00', barometer 29.29 (744.0), wind sw. by w. force 5, and the s.s. "Daniel Steinmann," near the same position, reported frequent thunder and lightning accompanied by heavy rain showers. Fresh breezes to moderate southerly gales occurred to the east of W. 50° on the 16th, and on the 17th, they changed to northerly, the centre of disturbance having reached N. 43°, W. 36°. The winds remained moderate in force during the day and the barometer near the centre showed no material change, but on the 18th, a considerable increase of pressure took place and the winds moderated to gentle or moderate breezes. During the following day, however, a rapid decrease of pressure occurred and the centre of depression, where the barometer ranged from 29.5 (749.3) to 29.6 (751.8), was shown near N. 48°, W. 22°, attended by strong breezes to moderate gales in the eastern quadrants while the winds to the west of the centre had also increased in force. On the morning of the 20th, this depression apparently passed northeastward toward the Irish coast, while the report of the s.s. "Ptolemy," indicated the presence of another disturbance to the southward of the forty-fifth parallel and probably at some distance from the coast of Spain. On the 19th, in N. 46° 35', W. 23° 20', the barometer began to fall quickly, the decrease in twenty-four hours amounting to .6 inch; on the 20th, in N. 46° 50', W. 18° 20', in read 29.56 (750.8), wind e., force 8. The storm-centre apparently moved northeastward, and on the 21st, it was over the Bay of Biscay, causing strong easterly and northeasterly winds in the northeast quadrant.

VI.—From the 21st to the 25th, the barometer remained low and fluctuating over the region to the southeast of the Maritime Provinces, and stormy weather prevailed off the coast of the United States during that period. On the 26th, the region of least pressure was situated south of Newfoundland; the pressure decreased to the eastward and the winds remained moderate, but in the western quadrants they showed no material diminution of force. On the 27th, the barometric readings within the area of disturbance ranged from 29.1 (739.1) to 29.4 (746.7). On the 28th, the pressure varied from 29.3 (744.2) to 29.5 (749.3), and the depression extended from W. 45° to W. 25°; within this region no high winds were reported. During the 29th, 30th, and 31st, the disturbance apparently moved northeastward along the coasts of the British Isles.

VII.—This is probably a continuation of low area ix. of chart i. It passed off the coast of the Carolinas into the Atlantic on the 26th, accompanied by strong gales. On the 27th, the storm-centre was probably near N. 35°, W. 72°; on that day the s. s. "Finance," reported heavy rain, barometer 29.42 (744.7), wind variable, shifting from nw. to s., se., and nw., the gale being heaviest from the north-northwest, when it attained a force of 7, with very high sea. On the 28th, the ship "W. Woodbury," in N. 34° 31', W. 65° 42', reported barometer 29.44 (747.8), wind shifting from sse., force 4, to nw., force 9, weather cloudy. To the westward the winds moderated considerably and a general improvement took place in the weather. From the 28th to the 31st the pressure remained low over the ocean from Newfoundland eastward to the British Isles, the circulation of the winds in the western portion of the Atlantic indicating that the disturbance was north of the forty-fifth parallel.

OCEAN ICE.

Chart ii. also shows the southern and eastern limits of icebergs in the north Atlantic during the month of March, 1883. This chart is based on reports communicated by ship-masters to this office; reports furnished through the co-operation of the "New York Herald Weather Service," and other data published by the "New York Maritime Register."

A comparison of this chart with that for the preceding month (February), shows that the ice has moved southward about one degree, the southern limit in March being very near to the forty-first parallel. North of the forty-fifth parallel there appears to have been no easterly movement; on the contrary, the eastern limit in March is about one degree to the westward of that for February. But to the southward of N. 45° a decided movement toward the east is shown, the limit being about two and one-half degrees farther eastward than in the preceding month.

The reports indicate that icebergs and field-ice were most numerous from N. 42° to N. 45°, and between W. 49° and W. 52°. Icebergs and field-ice were reported as follows:

2d.—Bark "Lillian M. Vigus," ran into ice in N. 43°, W. 47°; it extended in all directions as far as could be seen; sailed through it for three days before reaching open water.

4th.—S. S. "Norseman," in N. 45°, W. 47°, and N. 44° 15', and N. 44° 15', W. 49° 00', passed large ice-fields and saw from forty to fifty icebergs.

6th.—S. S. "Glenmavis," in N. 47° 20', W. 45° 00', passed a large iceberg; same day at 5 p. m. entered ice-field and passed through it for several hours, it being sixty miles in length; steered southward for forty miles to avoid more ice-fields. The s. s. "W. A. Scholten," in N. 43° 50', W. 49° 15', passed four icebergs.

7th.—S. S. "Romano," encountered ice in N. 46° 10', W. 47° 04'; got clear of ice in N. 45° 17', W. 49° 01'.

8th.—S. S. "Hammonia," in N. 43° 14', W. 48° 45', sighted twenty icebergs; got clear of ice in N. 42° 40', W. 50° 51'. The bark "J. F. Whitney," in N. 43° 10', W. 50° 15', passed three large icebergs and some drift-ice; ship "J. Weissenhorn," in N. 43° 20', W. 48° 25', passed an iceberg.

9th.—S. S. "Holland," in N. 43° 25', W. 48° 02' passed three small icebergs; ship "J. Weissenhorn," in N. 42° 20', W. 50° 30', passed an iceberg; bark "Enrichette Accame," in N. 43° 25', W. 48° 11', saw a large iceberg; s. s. "Weser," in N. 42° 40', W. 49° 03', passed three icebergs and several pieces of ice.

10th.—S. S. "Holland," in N. 42° 18', W. 51° 33', passed five icebergs; ship "Carl," from 10th to 13th, in N. 42° 30' and from W. 47° to 50°, passed numerous icebergs; ship "Else," in N. 48°, W. 44°, passed an iceberg from one hundred to one hundred and twenty feet high, and about four hundred feet long. The bark "Orpheus," between the 10th and 11th; N. 43° 30', W. 48° 20', to N. 42° 40', W. 49° 50', passed eight large icebergs and several smaller ones; some were about four hundred and fifty feet high; the smallest was about eighty feet high.

11th.—S. S. "Leerdam," in N. 42° 44', W. 49° 18', passed several icebergs, some of which were eighty feet above water, also saw a quantity of field-ice; s. s. "Hermod," in N. 43° 04', W. 49° 15', observed twenty large icebergs, the last iceberg seen to the westward was in N. 42° 42', W. 52° 00', where some field-ice was also observed. From the 11th to the 16th, the ship "Else," between N. 48°, W. 44°, and N. 43°, W. 51°, passed large quantities of field-ice and about thirty icebergs.

12th.—From the 12th to the 15th, ship "Tamerlane," between N. 42°, W. 48°, and N. 43° W. 50°, passed about twenty icebergs, ranging from twenty to one hundred feet in height.

13th.—S. S. "Elbe," in N. 43° 47', W. 47° 22', passed a large iceberg; ship "Arbela," N. 42° 30' W. 50° 37', passed an iceberg; ship "Hamilton Fish," in N. 43° 00', W. 48° 30', saw a number of icebergs; ran ship to the southward to get clear of ice.

14th.—S. S. "Elbe," in N. 42° 25', W. 50° 22', saw a large iceberg, with several smaller pieces near it; s. s. "City of

Berlin," in N. 42° 40', W. 49° 30', saw a large iceberg; s. s. "Notting Hill," in N. 45° W. 49°, encountered large fields of ice, steamed southward for twenty hours to avoid them; ship "Arbela," in N. 42° W. 52° 30', passed small ice.

15th.—S. S. "Circassian," in N. 43° 56', W. 47° 15', saw five icebergs of medium size; bark "General Birch" was found fast in the ice in N. 45° 00', W. 48° 30'; bows stove, and vessel abandoned and full of water; ship "Sultan," in N. 42° 32', W. 49° 18', passed several icebergs and a quantity of field-ice; s. s. "Island," in N. 43° 25', W. 48° 23', passed a large number of icebergs and much field-ice; the s. s. "Iowa," in N. 44° 06' W. 47° 28', reported numerous icebergs in sight all day.

16th.—S. S. "Circassian," in N. 43° 05', W. 49° 00', saw two small icebergs and one large one; s. s. "Labrador," in N. 44° 29', W. 49° 11', passed an iceberg; the s. s. "Boston City," encountered an immense ice-field on the Banks; the bark "Diamant," from the 16th, in N. 46° 06', W. 46° 17' to the 19th in N. 43° 42', W. 49° 50', passed through large quantities of field-ice and saw numerous large icebergs.

17th.—S. S. "Circassian," in N. 43° 17', W. 49° 35', saw four large icebergs; s. s. "Abyssinia," in N. 42° 40', W. 49° 30', passed three large icebergs and several detached pieces; s. s. "Gellert," in N. 42° 50', W. 50° 13', passed a large iceberg; s. s. "Labrador," in N. 43° 12', W. 52° 46', passed four large icebergs; the bark "Olbers" reported: run into ice in N. 46° 41' W. 47° 00'; was obliged to tack ship and run e. to clear it; saw many icebergs, none of which were less than one hundred feet high, and some were seen twenty miles distant. We saw, in all, forty bergs, none of them smaller than the vessel. The last observed were in N. 44° 26', W. 48° 30'. The bark "Christel," in N. 47° 20', W. 46° 20', fell in with icebergs and field-ice; got clear on the 20th, in N. 44° 43', W. 50° 49'; during that time saw fourteen large icebergs; had considerable metal torn off by ice.

18th.—The s. s. "Rheola," at New York, reported: from N. 44° W. 50° to N. 43° W. 52° 30', passed through immense fields of ice, studded with numerous icebergs.

19th.—S. S. "Rotterdam," in N. 43° 47', W. 48° 02', sighted a large iceberg and two small pieces, distant about two miles; s. s. "City of Paris," in N. 42° 39', W. 49° 41', saw an iceberg about five miles to the northward; also in N. 42° 45', W. 49° 00', saw another about ten miles distant.

20th.—S. S. "Fulda," from N. 43° 58', W. 48° 00' to N. 43° 18', W. 50° 43', passed several icebergs and quantities of field-ice.

21st.—S. S. "Stella," in N. 41° 46', W. 49° 48', passed an iceberg about one hundred feet long and thirty feet high, distant about eight miles; s. s. "Critic," between N. 44° 30', W. 48° 30', and N. 43° 30', W. 51° 00', passed about twenty large icebergs and large quantities of field-ice.

22d.—S. S. "Hedwig," in N. 43° 45', W. 48° 12', passed a large iceberg about two hundred feet high; in N. 43° 13', W. 49° 23', passed five others; the s. s. "Lake Huron," at New York, reported: in N. 43° 20', W. 49° 50', passed a number of icebergs.

23d.—S. S. "Servia," in N. 42° 37', W. 49° 52', passed four icebergs.

24th.—The ship "Edward," in N. 45° 30', W. 48° 30', reported: reached an enormous field of ice; could not see open water from the royals, but discovered several icebergs, some very large; sailed along the eastern edge of the ice-field, which appeared to be very compact in s. and sw. direction; proceeded forty miles before getting into navigable water. On the following day, passed six icebergs and some small field-ice.

25th.—S. S. "California," in N. 43° 10', W. 50° 30', passed a large iceberg with flat top.

26th.—S. S. "Britannic," in N. 42° 51', W. 50° 36', passed three icebergs.

29th.—S. S. "Sardinian," in N. 44° 02', W. 51° 33', passed an iceberg.

30th.—S. S. "Alaska," in N. 42° 47', W. 50° 19', saw an iceberg to the northward.

31st.—S. S. "Weser," in N. 44° 58', W. 49° 36', passed several small icebergs and pieces of floating ice; s. s. "Canada," in N. 42° 15', W. 53° 00', saw an iceberg.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada, for the month of March, 1883, is exhibited on chart iii., by the dotted isothermal lines.

The mean temperature of the month is below the normal in all districts east of the one hundredth meridian, from 0°.6 in the Missouri valley to 6°.5 in the lower lake region. Along the Atlantic coast and in the Ohio valley, the temperature averaged about 4° below the normal; in the Gulf states, about 2°.6, and in Florida 1°.3. In the Rocky mountain regions and on the Pacific coast, the mean temperature is above the normal from less than 1° in the northern plateau to 2°.9 in southern California. On the summit of Mount Washington, New Hampshire, the mean temperature of the month is 11° below the normal, and on the summit of Pike's Peak, Colorado, it is 5°.5 above the normal.

The following are some of the extreme monthly mean temperatures reported from Signal-Service stations:—

Stations reporting highest.	Stations reporting lowest.
Key West, Florida..... 72.7	Mt. Washington, New Hampshire... 0.9
Rio Grande City, Texas..... 71.0	Saint Vincent, Minnesota..... 5.7
Laredo, Texas..... 68.6	Pike's Peak, Colorado..... 13.0
Brownsville, Texas..... 67.5	Moorhead, Minnesota..... 14.1
Yuma, Arizona..... 67.3	Escanaba, Michigan..... 17.4
Punta Rassa, Florida..... 67.1	Mackinaw City, Michigan..... 17.5
San Carlos, Arizona..... 66.3	Fort Stevenson, Dakota..... 17.8
Uvalde, Texas..... 64.6	Marquette, Michigan..... 17.9
Phoenix, Arizona..... 64.5	Alpena, Michigan..... 18.4

The following table has been prepared to show the districts of maximum departures from the normal temperature, with brief remarks upon the distribution of mean temperature for March of each year since 1874. The plus (+) and minus (−) signs denote above and below the normal, respectively:

Year.	Districts.	Departure.	Remarks.
1874	South Atlantic states.....	+ 2	Normal in lake region, New England, middle Atlantic states, and on the Pacific coast; below the normal in the upper Mississippi and Missouri valleys; above the normal in the south Atlantic and Gulf states.
	Upper Mississippi valley.....	− 3	
1875	Upper lakes.....	− 5.3	Below the normal everywhere, except on the Pacific coast and in the south Atlantic states.
	Lower lakes.....	− 5.1	
	Mississippi valley.....	− 5.2	
	Missouri valley.....	− 7.1	
1876	Pacific coast.....	+ 2.1	Below the normal in all districts, except on the Pacific coast.
	Minnesota.....	− 7.5	
	Lower Missouri valley.....	− 5.9	
	Upper Mississippi valley.....	− 4.1	
1877	Minnesota.....	− 6.6	Above the normal on the Atlantic coast; normal in the Gulf states and lower Missouri valley; below the normal over the districts from the lake region westward to the Rocky mountains.
	Upper Mississippi valley.....	− 3.3	
	New England.....	+ 3.4	
	Upper Missouri valley.....	+ 2.3	
1878	Missouri valley.....	+ 22.4	Month very warm throughout the whole country; temperature above the normal everywhere; departures most marked from the Ohio valley and lake region westward to the Rocky mountains.
	Minnesota.....	+ 21.7	
	Upper Mississippi valley.....	+ 15.4	
	Lower Missouri valley.....	+ 14.6	
1879	Upper lakes.....	+ 13.7	Above the normal over the entire country, except slightly below in the Saint Lawrence valley.
	Middle slope.....	+ 7.1	
	Southern slope.....	+ 6.0	
	Western Gulf states.....	+ 5.1	
1880	Northern slope.....	− 7.3	Below the normal from the Missouri valley westward to the Pacific, and in Canada and New England; above the normal from the lakes to the Gulf, and in the middle and south Atlantic states.
	Canadian maritime stations.....	− 5.9	
	Red river (of the north) valley.....	− 5.1	
	Florida.....	+ 4.3	
1881	South Atlantic states.....	+ 3.3	Normal in the lake region; above the normal in the Saint Lawrence valley and in New England, below the normal in other districts east of the Mississippi; above the normal on the middle and north Pacific coast.
	North Pacific coast.....	+ 4.0	
	Northern slope.....	+ 8.5	
	Saint Lawrence valley.....	+ 6.2	
1882	New England.....	+ 3.4	Above the normal in all districts east of the Rocky mountains, and below the normal on the Pacific coast, except in Oregon and Washington Territory.
	South Atlantic states.....	− 4.8	
	Tennessee.....	+ 5.3	
	North Pacific coast.....	+ 7.8	
	Ohio valley.....	+ 4.8	

In the first column of the following table is shown the mean

temperature of March in previous years for the several districts, as determined from observations made at the Signal Service stations; the second column shows the mean temperature of March, 1883, and the third column shows the departure of March, 1883, from the normal.

Average Temperatures for March, 1883.

Districts.	Average for March Signal Service observa- tions.		Comparison of Mar., 1883, with the average for several years.
	For several years.	For 1883.	
New England.....	34.6	29.9	4.7 below.
Middle Atlantic states.....	41.3	37.9	3.4 below.
South Atlantic states.....	54.4	50.1	4.3 below.
Florida peninsula.....	66.7	65.4	1.3 below.
Eastern Gulf.....	58.6	55.5	3.1 below.
Western Gulf.....	59.9	57.7	2.2 below.
Rio Grande valley.....	67.0	66.1	0.9 below.
Tennessee.....	50.6	47.6	3.0 below.
Ohio valley.....	42.6	38.5	4.1 below.
Lower lakes.....	32.4	25.9	6.5 below.
Upper lakes.....	28.7	23.9	4.8 below.
Extreme northwest.....	20.6	18.2	2.4 below.
Upper Mississippi valley.....	36.9	33.3	3.6 below.
Missouri valley.....	33.9	33.3	0.6 below.
Northern slope.....	32.8	35.1	2.3 above.
Southern slope.....	57.6	54.1	3.5 below.
Northern plateau.....	40.7	41.1	0.4 above.
Middle plateau.....	40.1	46.5	6.4 above.
Southern plateau.....	52.9	55.4	2.5 above.
North Pacific.....	45.9	49.2	3.3 above.
Middle Pacific.....	54.0	56.1	2.1 above.
South Pacific.....	57.5	60.4	2.9 above.
Mount Washington, N. H.....	11.9	0.9	11.0 below.
Pike's Peak, Colo.....	7.5	13.0	5.5 above.
Denver, Colo.....	39.5	43.8	4.3 above.

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the table of comparative temperatures.

The Chief Signal Officer is indebted to voluntary observers for the following notes upon this subject. As some of these comparisons are made with the averages determined from records covering periods extending back many years before the establishment of the Signal Service they will be found of special interest.

Connecticut.—Southington: mean temperature, 27°.6, is the lowest March mean of the last twenty-seven years, with the exception of that of March, 1872.

Illinois.—Anna: mean temperature 42°.49, or 9°.57 below the March average of the last seven years. Riley: mean temperature 26°.6, or 3°.4 below the March average of the last twenty-two years. Swanwick: mean temperature 38°.7, or 7°.3 below the March average. Morrison: mean temperature 30°.0, is 4°.1 below the March average of last nine years.

Indiana.—Logansport: mean temperature, 34°.5, is 5°.7 below the March average of the last twenty-four years. The highest March mean of that period, 49°.5, occurred in 1860; lower March means occurred in 1867, '72 and '77. The greatest March extremes for the same period occurred in 1875, the maximum being 84°, and the minimum —10°. A comparison of the five winter months (November to March inclusive) of 1882-3, with the corresponding months since the winter of 1859-60, shows the mean temperature of the past winter, 30°.5, to be 1° below the average. The highest winter mean, 40°.1, was that of 1881-2; the lowest, 23°.5, was that of 1871-2. Wabash: mean temperature 34°.8, or 3°.41 below the March average of six years.

Kansas.—Professor F. H. Snow, of the State University at Lawrence, reports: mean temperature 40°.9, or 0°.9 below the March average of the fifteen preceding years. The highest March mean of that period, 50°.9, occurred in 1868 and 1878; the lowest, 34°.2, occurred in 1876. The March extremes for the same period are: highest, 93° in 1868; lowest, —1° in 1869. Wellington: mean temperature 39°.0, or 5°.9 below March average of four years, and is the lowest for the same

period. Yates Centre: mean temperature 39°.0, or 1°.8 below the average of three years.

Maine.—Gardiner: mean temperature 23°.0, or 6°.65 below the March mean of forty-seven years, and with the exception of March, 1872, (mean 21°.99), it is the lowest for that period. The mean temperature of the past winter, 18°.76, is 3°.87 below the winter average of forty-seven years, and it has been the coldest winter recorded during that time.

Maryland.—Fallston: mean temperature, 34°.3, is 4°.4 below the March average of the last thirteen years. The highest March mean of that period, 46°.2, occurred in 1871; the lowest, 32°.9, occurred in 1872. The maximum temperature of March, 1883, (63°), has been exceeded in every year during March since 1865.

Sandy Springs: mean temperature, 34°.3, is 5°.3 below the March average of the last fifteen years, and is the lowest March mean of that period.

Massachusetts.—Westborough: mean temperature 26°.9, or 8° below the March average of seven years.

The following table, prepared by Mr. J. Brainerd Hall, of Worcester, shows the mean temperature of the winter months at that place since 1839:

Winter.	November.	December.	January.	February.	March.	Mean.
1839-40.....	37.6	30.2	18.6	32.5	36.7	31.5
1840-41.....	35.6	27.3	32.5	24.8	33.2	30.6
1841-42.....	37.7	31.3	30.3	33.9	37.1	34.1
1842-43.....	34.5	26.0	32.9	20.3	26.8	28.2
1843-44.....	36.3	29.8	18.0	27.0	35.9	29.6
1844-45.....	38.4	29.6	28.1	27.0	37.4	32.5
1845-46.....	40.9	30.3	28.6	21.7	38.8	32.1
1846-47.....	43.1	26.5	26.6	25.1	31.8	31.0
1847-48.....	44.6	35.4	29.4	27.1	33.7	34.0
1848-49.....	34.4	32.0	20.9	18.1	34.3	27.9
1849-50.....	40.7	27.3	24.0	30.0	34.0	32.4
1850-51.....	41.7	24.5	26.0	29.5	36.0	31.5
1851-52.....	36.6	21.8	20.1	25.6	31.5	28.1
1852-53.....	40.2	34.2	25.7	28.3	35.6	32.8
1853-54.....	40.3	27.0	23.0	22.6	32.3	29.0
1854-55.....	39.3	24.8	27.5	18.5	32.4	28.5
1855-56.....	39.5	29.4	16.7	20.4	22.9	25.7
1856-57.....	39.1	25.6	16.9	32.4	32.1	29.2
1857-58.....	40.4	31.3	31.3	22.6	32.6	31.8
1858-59.....	35.0	28.3	26.6	29.0	39.0	31.6
1859-60.....	41.0	24.3	27.3	25.6	37.6	31.2
1860-61.....	42.6	26.0	22.6	32.6	33.6	31.4
1861-62.....	43.3	32.6	24.6	24.0	33.0	31.5
1862-63.....	41.6	31.6	31.0	29.0	28.3	32.4
1863-64.....	43.0	28.3	28.6	27.3	39.0	32.6
1864-65.....	41.3	27.3	19.3	27.3	37.0	30.4
1865-66.....	42.3	32.3	24.0	27.6	32.3	31.7
1866-67.....	43.3	28.0	18.6	31.3	30.0	30.2
1867-68.....	38.0	22.3	20.6	19.3	33.3	26.7
1868-69.....	37.3	22.0	28.3	27.0	28.3	28.8
1869-70.....	39.0	20.6	31.0	24.3	29.0	30.6
1870-71.....	40.3	29.0	23.0	26.0	40.3	31.7
1871-72.....	36.9	20.9	26.3	23.9	26.0	28.0
1872-73.....	40.5	21.6	21.1	20.6	29.5	26.7
1873-74.....	24.6	29.4	28.5	24.9	32.7	28.0
1874-75.....	33.8	29.7	18.0	19.4	27.9	25.7
1875-76.....	32.6	27.6	29.7	27.5	30.9	29.7
1876-77.....	41.1	21.3	25.3	31.2	32.7	30.5
1877-78.....	42.7	38.0	25.5	29.2	39.3	39.9
1878-79.....	38.2	28.1	21.8	22.2	23.4	26.5
1879-80.....	38.9	31.4	34.9	27.6	33.0	35.2
1880-81.....	36.0	23.7	22.5	24.9	35.5	28.5
1881-82.....	38.9	34.5	22.9	27.1	33.1	31.3
1882-83.....	37.4	25.0	20.0	23.5	25.0	24.2
Means.....	39.0	28.3	24.9	23.6	32.3	29.6

The following extract is also taken from the report furnished by Mr. Hall:

While the winter of 1882-3 is the coldest, as a whole, of which we have a record, still the minimum temperature was but —3°. There are many instances in the past when it has been —10° and —12°, while in February, 1861, it was —18°.5; yet the average temperature for the winter of 1860-61 was 31°.2, which is 1°.6 above the average winter temperature, and 7° above the average of the winter of 1882-3.

Michigan.—Lansing: mean temperature, 28°.0, is 5°.45 below the average of nineteen years.

Thornville: mean temperature 25°.9, or 7° below the March normal.

New Hampshire.—Grafton: mean temperature, 18°.7, is 10°.7 below the March average of 1878, 1879, and 1880.

New Jersey.—South Orange: mean temperature, 32°.1, is 4°.3 below the March average of thirteen years, and is the lowest March mean of that period with the exception of that of 1872, when it was 28°.77.

New York.—Palermo: mean temperature $19^{\circ}.4$, or 8.7 below the March average of the last thirty years. The highest March mean of that period, $38^{\circ}.5$, occurred in 1871; the lowest is that for March 1883.

North Volney: mean temperature $22^{\circ}.2$, or $6^{\circ}.36$ below the March average of sixteen years. The highest March mean of that period, $37^{\circ}.39$, occurred in 1878; the lowest $21^{\circ}.15$ occurred in 1872.

Pennsylvania.—Dyberry: mean temperature, $23^{\circ}.95$, is $5^{\circ}.4$ below the March average of nineteen years. The highest

March mean of that period, $37^{\circ}.5$, occurred in 1878; the lowest, $22^{\circ}.4$, occurred in 1872. The March extremes of the last nineteen years are: maximum 72° in 1865; minima, -19° in 1873 and -22° in 1868.

Wellsboro: mean temperature, $25^{\circ}.3$, is $5^{\circ}.9$ below the March average of last ten years, and is the lowest for that period.

Texas.—New Ulm: mean temperature, $62^{\circ}.4$, is $1^{\circ}.3$ below the March normal of the last eleven years. The highest March mean of that period, $68^{\circ}.4$, occurred in 1878; the lowest $59^{\circ}.7$ occurred in 1875. The March extremes of the last eleven

Table of Comparative Minimum Temperatures for the Month of March.

State or Territory.	Minimum for March, 1883, Signal Service.		Lowest since Signal-Service stations were opened—3 to 12 years.			Lowest from any other source.			
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record.
Alabama	Montgomery	35	Mobile	25	1873	Huntsville	11		9 years
Do						Thomas Barracks	18	'76, '78	3
Arizona	Fort Apache	27	Prescott	-8	1875	Fort Canby (old)	-1		12
Do						Fort Apache	-5	1875	8
Arkansas	Little Rock	24	Little Rock	32	'80, '81	Fort Smith	-3	1840?	22
Do						Durham	2	1875	1
California	Cape Mendocino	38	Campo	15	1882	Camp Bidwell	0		19
Do						Fort Crook	2		12
Colorado	Pike's Peak	-3	Denver	-10	1880	Fort Lyon	-7		23
Do	West Las Animas	10	Pike's Peak	-29	1873	Pagosa Springs	-20	1881	12
Connecticut	New Haven	3	New Haven	6	'75, '76	Colebrook	-10		12
Do						New Haven	-9		86
Dakota	Tobacco Garden	-18	Pembina	-40	1873	Fort Abercrombie	-40	'61, '69?	19
Do						Fort Buford	-40	1867	14
Delaware	Delaware Breakwater	19	Delaware Breakwater	25	1880	Fort Delaware	-5		45
Dist. of Columbia	Washington	14	Washington	4	1873	Washington	-3		49
Florida	Jacksonville	40	Jacksonville	31	'73, '76	Fort Barrancas	28		59
Do			Saint Marks	32	1876	Fort King	27		10
Georgia	Atlanta	26	Angusta	22	1873	Fort McPherson	7	1877	7
Do						Atlanta	-12		6
Idaho	Eagle Rock	0	Eagle Rock	-16	1882	Fort Hall	-1		5
Do			Boise City	10	1880	Fort Lapwai	-1		19
Illinois	Chicago	10	Chicago	1	1873	Rock Island Arsenal	-14		11
Do						Belvidere	-20	1877	5
Indiana	Indianapolis	12	Indianapolis	2	1873	Spiceland	0		14
Do						Kokomo	-10	1875	1
Indian Territory	Fort Reno	14	Fort Gibson	7	1876	Fort Gibson	7		48
Do						Camp Supply	-2	1876	2
Iowa	Davenport	3	Dubuque	-10	1875	Aigona	-25		10
Do						Vale	-25	1880	7
Kansas	Leavenworth	14	Dodge City	-8	1880	Fort Riley	-9		21
Do						Fort Leavenworth	-9		52
Kentucky	Louisville	30	Louisville	3	1873	Newport Barracks	3		29
Louisiana	Shreveport	25	Shreveport	26	1876	Fort J. sup	16		23
Do						Baton Rouge	26		58
Maine	Eastport	-4	Eastport	-1	'75, '80	Gardiner	-20		43
Do						Brunswick	-19		53
Maryland	Baltimore	16	Baltimore	5	1873	Fort McHenry	0		63
Massachusetts	Provincetown	7	Springfield	-1.5	1875	Williamstown	-12		63
Do						Billerica	-14	1875	11
Michigan	Escanaba	-15	Escanaba	-20	1875	Fort Brady	-32		60
Do						Ontonagon	-22		11
Minnesota	Saint Paul	-8	Breckenridge	-32	1873	Fort Ripley	-27		18
Do						Fort Snelling	-37		63
Mississippi	Starkville	28	Vicksburg	27	1876	Columbus	-24		10
Missouri	Saint Louis	19	Saint Louis	8	'73, '76	Harrisonville	20		6
Do						Saint Louis	-12		39
Montana	Glendive	-4	Fort Benton	-42	1876	Fort Ellis	-36		14
Do						Fort Benton	-42	1876	2
Nebraska	Omaha	3	North Platte	-21	1880	Glendale	-20	1868	1
Do						Bellevue	-15		11
Nevada	Pioche	26	Winnemucca	-3	1882	Camp Halleck	-8	1880	13
New Hampshire	Mount Washington	-34	Mount Washington	-31	1874	Dartmouth College	-23		18
Do						Stratford	-22		11
New Jersey	Sandy Hook	10	Cape May	9	1873	Paterson	0		9
Do			Squan Beach	9	1875	Newark	0		18
New Mexico	Fort Bayard	31	Santa Fe	0	1880	Fort Union	-12	'80, '82	32
New York	Hudon	2	Albany	-4	1875	Madison Barracks	-30		57
Do						Sackett's Harbor	-34		5
North Carolina	Charlotte	26	Wilmington	20	1873	Franklin	6	1876	58
Do						Fort Johnson	14		76
Ohio	Cleveland	6	Cleveland	-2	1873	Granville	-14		6
Do			Toledo	-1	1873				
Oregon	Umatilla	31	Umatilla	11.5	1880				
Do									
Pennsylvania	Erie	2	Erie	2	1877	Camp Harney	-3		7
Do						Fort Klamath	-10	1882	6
Rhode Island	Narragansett Pier	5	Pittsburg	2	'73, '77	Pennsville (near)	-14		123
South Carolina	Charleston	39	Newport	9	1876	Philadelphia	-5		41
Do			Charleston	25	1873	Fort Adams	-6		25
Tennessee	Knoxville	24	Knoxville	6	1873	Fort Moultrie	25		105
Do						Charleston	31		11
Texas	Fort Elliott	17	Fort Elliott	-2	1880	Glenwood Cottage	11	1876	11
Do						Humboldt	-52		23
Utah	Salt Lake City	39	Salt Lake City	-4	1874	Fort Davis	9	1880	2
Vermont			Burlington	-4	1873	Fort Elliott	1		3
Do						Fort Crittenden	-2		5
Virginia	Cape Henry	127	Wytheville	-1	1873	Randolph	-27		18
Do	Chincoteague	17	Lynchburg	6	1873	Lanenburg	-23		58
Washington	Spokane Falls	5	Spokane Falls	7	1882	Fortress Monroe	13		6
West Virginia	Morgantown	14	Morgantown	0.5	1873	Snowville	9		20
Do						Fort Colville	-20		3
Wisconsin	Madison	1	La Crosse	-23	1873	Weston	2	1877	5
Do						Helvetia	-4		3
Wyoming	Fort Washakie	-10	Cheyenne	-17	1880	Superior City	-24		26
Do						Fort Crawford	-23		20
						Fort Bridger	-29		4
						Fort Sanders	-28	1875	

Table of Maximum and Minimum Temperatures for March, 1883.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
Alabama.....	Mobile.....	80	0	Auburn.....	77	0
Do.....	Montgomery.....	79	35	Mount Vernon Barracks.....	82	35
Arizona.....	Phoenix.....	92	38	Texas Hill.....	95	54
Do.....	Fort Apache.....	75	27	Mount Ida.....	76	22
Arkansas.....	Fort Smith.....	82	28	Borden.....	98	32
Do.....	Little Rock.....	76	24	Cisco.....	64	25
California.....	Los Angeles.....	84	43	Fort Lyon.....	75	13
Do.....	Cape Mendocino.....	69	38	Colorado Springs.....	68	0
Colorado.....	West Las Animas.....	74	10	Southington.....	57	-0.8
Do.....	Pike's Peak.....	29	-3	Morrison.....	77	0
Connecticut.....	New Haven.....	58	3	Fort Pembina.....	40	-33
Dakota.....	Fort Sully.....	76	2			
Do.....	Tobacco Garden.....	-18				
Do.....	Fort Stevenson.....	44	-12			
Delaware.....	Del. Breakwater.....	60	19	Receiving Reservoir.....	74	16
District of Columbia.....	Washington.....	70	14	Mayport.....	83	40
Florida.....	Sanford.....	86	48	Fort Barrancas.....	77	34
Do.....	Key West.....	86	00			
Do.....	Jacksonville.....	79	40	Forsyth.....	78	33
Georgia.....	Savannah.....	80	40			
Do.....	Atlanta.....	75	26	Bunker Hill.....	77	16
Idaho.....	Fort Lapwai.....	73	23	Riley.....	58	3
Do.....	Eagle Rock.....	62	0	Polo.....	52	3
Illinois.....	Springfield.....	73	14	Vincennes.....	77	20.5
Do.....	Chicago.....	62	10	Miami.....	70	-3
Indiana.....	Indianapolis.....	68	12			
Do.....	Fort Reno.....	82	14	Legan.....	72	7
Indian Territory.....	Keokuk.....	68	11	Cresco.....	46	-13
Iowa.....	Davenport.....	63	3	Clay Centre.....	80	10
Do.....	Leavenworth.....	71	14	Topeka.....	74	9
Kansas.....	Louisville.....	71	20	Bowling Green.....	71	21
Do.....				Frankfort.....	68	16
Kentucky.....				Point Pleasant.....	80	37
Do.....	Shreveport.....	81	35	Dexter.....	52	-20
Louisiana.....	Portland.....	52	-0.5			
Maine.....	Eastport.....	45	-4	Sandy Springs.....	71	10
Do.....	Baltimore.....	65	16	McDonough.....	65	9
Maryland.....				Somerset.....	60	-3
Massachusetts.....	Boston.....	58	8	Heath.....	54	-8
Do.....	Provincetown.....	52	7	Lansing.....	59	-4
Michigan.....	Detroit.....	58	3	Fort Brady.....	4	-20
Do.....	Escanaba.....	52	-15	Fort Snelling.....	33	-30
Minnesota.....	Saint Paul.....	52	-8	Fayette.....	78	37
Mississippi.....	Vicksburg.....	79	35			
Do.....	Starkville.....	79	28	Protem.....	81	23
Missouri.....	Saint Louis.....	78	19	Corning.....	68	10
Do.....						
Montana.....	Cartersville.....	79	3	Utica.....	76	4
Do.....	Glendive.....	70	-4	Fort Niobrara.....	75	-2
Nebraska.....	North Platte.....	71	12	Golconda.....	83	23
Do.....	Omaha.....	71	3	Boca.....	78	12
Nevada.....	Pioche.....	65	20	Bristol.....	40	10
Do.....				Moorestown.....	64	10
New Hampshire.....	Mt. Washington.....	35	-34	Somerville.....	61	4
New Jersey.....	Sandy Hook.....	62	10	Fort Union.....	71	10
Do.....	Barnegat City.....	62	12			
New Mexico.....	Fort Bayard.....	82	31	Factoryville.....	63	0
Do.....	Santa Fé.....	86	24	Johnstown.....	54	-13.5
New York.....	New York City.....	60	10	Weldon.....	74	22
Do.....	Buffalo.....	50	2	Ore Knob.....	62	10
North Carolina.....	Kittyhawk.....	77	27	Westerville.....	68	4
Do.....	Charlotte.....	74	20			
Ohio.....	Sandusky.....	69	10	Eola.....	70	30
Do.....	Cleveland.....	65	6	Dyberry.....	51	-15
Oregon.....	Umatilla.....	70	31			
Pennsylvania.....	Pittsburg.....	69	11	Stateburg.....	75	34
Do.....	Erie.....	56	2	Ashwood.....	70	25
Rhode Island.....	Narragansett Pier.....	56	5	Murfreesborough.....	69	23
South Carolina.....	Charleston.....	74	36			
Tennessee.....	Chattanooga.....	76	28	Terrace.....	82	25
Do.....	Knoxville.....	70	24	Kelton.....	72	20
Texas.....	Laredo.....	95	40	Woodstock.....	52	-26.5
Do.....	Fort Elliott.....	78	17	Accotink.....	74	16
Utah.....	Salt Lake City.....	66	30	Variety Mills.....	72	12
Do.....						
Vermont.....				Helvetia.....	66	8
Virginia.....	Cape Henry.....	73	12?	Franklin.....	50	-17
Do.....	Chincoteague.....	63	17	Belcit.....	57	5
Washington.....	Dayton.....	72	30			
Do.....	Spokane Falls.....	67	5			
West Virginia.....	Morgantown.....	65	14			
Wisconsin.....	Madison.....	53	1			
Do.....						
Wyoming.....	Fort Washakie.....	67	-10			

years are: maximum, 96° in 1874; minimum, 30° in 1873, '75, and '80.

Vermont.—Woodstock: mean temperature, 18°.14, is 7°.48 below the March average of the last sixteen years. The highest March mean of the period, 33°.34, occurred in 1871; the lowest, 16°.8, occurred in 1872. The March extremes of the last sixteen years are: maximum, 63° in 1878; minimum -28° in 1869.

Charlotte: mean temperature 20°, or about 10° below the average of March from 1870 to 1881, inclusive.

Virginia.—Wytheville: mean temperature, 38°.5, is 4°.3 below the average of a period of nineteen years.

Variety Mills: mean temperature, 39°.8, is 6°.2 below the average of the last six years, and the lowest for the same period. The highest March mean temperature, 51°.6, occurred in 1878.

West Virginia.—Helvetia: mean temperature, 35°.9, is 4°.8 below the March average of the last seven years.

RANGES OF TEMPERATURE AT SIGNAL-SERVICE STATIONS.

The monthly ranges of temperature over the entire country have varied from 23° at San Diego, California, and 26° at Punta Rassa, Florida, to 77° at Fort Washakie, Wyoming, and 78° at Huron, Dakota.

The smallest monthly ranges are: San Diego, California, 23°; Punta Rassa, Florida, 26°; Key West, Florida, 27°; Port Eads, Louisiana, 28°; San Francisco, California, 29°; Cedar Keys, Florida, 29°; Cape Mendocino, California, 31°; Pike's Peak, Colorado, 32°; Olympia, Washington Territory, 34°; Hatteras, Macon, and Portsmouth, North Carolina, 35°; Indianola and Galveston, Texas, 36°; New Orleans, Louisiana, 36°; Sacramento, California, 36°; Salt Lake City, Utah, 36°; Pensacola, Florida, 37°; Sanford, Florida, 38°; Charleston, South Carolina, 38°; Jacksonville, Florida, 39°; Fort Grant and Yuma, Arizona, 30°. The largest are: Huron, Dakota, 78°; Fort Washakie, Wyoming, 77°; Saint Vincent, Minnesota, 73°; Fort Bennett, Dakota, 73°; Mount Washington, New Hampshire, 69°; Omaha, Nebraska, 68°; Fort Keogh, Montana, 67°; Escanaba, Michigan, 67°; Fort Shaw, Montana, 66°; Moorhead, Minnesota, 66°; Yankton, Dakota, 66°; Duluth, Minnesota, 65°; Bismarck, Dakota, 65°.

The greatest daily ranges of temperature have varied in the different districts as follows:

New England.—From 26° at Provincetown, Massachusetts, on the 6th, to 39° on the summit of Mount Washington, New Hampshire, on the 6th.

Middle Atlantic states.—From 25° at Cape May, New Jersey, on the 20th, to 34° at Philadelphia, Pennsylvania, on the 20th, Washington, District of Columbia, and Cape Henry, Virginia, on the 15th.

South Atlantic states.—From 23° at Savannah, Georgia, on the 4th and 23d, to 36° at Augusta, Georgia, on the 4th.

Florida peninsula.—From 16° at Key West, on the 14th, to 26° at Sanford, on the 28th.

Eastern Gulf.—From 23° at New Orleans, Louisiana, on the 5th and 23d, to 36° at Starkville, Mississippi, on the 19th.

Western Gulf.—From 20° at Indianola, Texas, on the 20th, and at Port Eads, Louisiana, on the 28th, to 40° at Fort Smith, Arkansas, on the 18th.

Rio Grande valley.—From 30° at Brownsville, Texas, on the 25th, to 42° at Eagle Pass, Texas, on the 21st.

Ohio valley and Tennessee.—From 31° at Chattanooga, Tennessee, on the 13th, and at Memphis, Tennessee, on the 19th and 20th, to 38° at Columbus, Ohio, on the 18th, and 49° at Champaign, Illinois, on the 18th.

Lower lakes.—From 31° at Buffalo, New York, on the 9th, to 48° at Sandusky, Ohio, on the 18th.

Upper lakes.—From 30° at Port Huron, Michigan, on the 9th, to 47° at Escanaba, Michigan, on the 1st.

Extreme northwest.—From 44° at Bismarck, Dakota, on the 17th, to 54° at Saint Vincent, Minnesota, on the 17th.

Upper Mississippi valley.—From 34° at Dubuque, Iowa, on the 17th, to 50° at Springfield, Illinois, on the 18th.

Missouri valley.—From 37° at Yankton, Dakota, on the 8th, to 50° at Omaha, Nebraska, on the 18th.

Northern slope.—From 37° at Helena, Montana, on the 24th to 48° at Fort Benton, Montana, on the 7th.

Middle slope.—From 17° on the summit of Pike's Peak, Colorado, on the 18th, to 54° at Fort Elliott, Texas, on the 18th.

Southern slope.—From 35° at Henrietta and Jacksboro', Texas, on the 18th, to 44° at Fort Stockton, Texas, on the 27th.

Southern plateau.—From 29° at Santa Fé, New Mexico, on the 9th, to 45° at Fort Apache, Arizona, on the 26th.

Middle plateau.—From 25° at Salt Lake City, on the 17th, to 32° at Pioche, Nevada, on the 19th.

Northern plateau.—From 32° at Lewiston, Idaho, on the 17th, and at Dayton, Washington Territory, on the 22d, to 37° at Eagle Rock, Idaho, on the 3d and 23d, and at Fort Missoula, Montana, on the 17th.

North Pacific.—From 31° at Olympia, Washington Territory, on the 12th and 20th, to 42° at Roseburg, Oregon, on the 21st.

Middle Pacific.—From 20° at San Francisco, California, on the 1st, to 36° at Red Bluff, California, on the 3d.

South Pacific.—From 18° at San Diego, California, on the 1st, to 37° at Visalia, California, on the 1st.

The following are reports of remarkably sudden changes in temperature:—

Fallston, Maryland, 7th.—The temperature fell 28° from 2 to 7 p. m. on this date.

Quincy, Illinois, 18th.—The temperature fell from 70° at 3 p. m. to 30° at 6 p. m., a change of 40° in three hours.

Lincoln, Illinois, 18th.—A very remarkable change in temperature occurred here during the afternoon of this date.

Swanwick, Illinois, 18th.—The temperature fell from 73° at 2 p. m. to 31° at 9 p. m., a fall of 42° in seven hours, and at 7 a. m. of the 19th it had fallen to 21° giving a range of 52° for seventeen hours.

Mattoon, Illinois, 18th.—At 3 p. m. the temperature was 75° and at 6 p. m. 29°, a fall of 46° in three hours. This sudden change occurred during the prevalence of a strong north wind.

Springfield, Illinois, 18th.—The temperature fell 38° between 3.30 and 4 p. m., and during the seven hours ending at 10 p. m. it fell 50°.5, from 73° to 22°.5.

Logansport, Indiana.—From 1.30 p. m. of the 18th to 6 a. m. of the 19th, sixteen and one-half hours, the temperature fell 53°.

Saint Louis, Missouri, 18th.—The temperature fell from 78° at noon to 29° at 10.07 p. m., being a fall of 49°.

Green Springs, Alabama, 19th.—At 2 p. m. of this date, the thermometer read 77°, and during the succeeding fifteen hours the temperature fell 47°.

Huron, Dakota.—The maximum temperature of the 17th was 70°.5; minimum of the 18th,—7°.8.

Ithaca, New York, 18th.—Temperature fell from 63° at 2 p. m., to 31° at 9 p. m.

North Lewisburg, Ohio, 18th.—Temperature fell 25° in less than one hour.

FROSTS.

In the various districts they were reported on the following dates:—

New England.—1st to 31st.

Middle Atlantic states.—1st to 31st.

South Atlantic states.—1st to 4th, 8th to 13th, 16th to 27th.

Florida peninsula.—1st, 2d, 3d, 13th, 14th, 20th.

Eastern Gulf.—1st, 2d, 4th, 10th to 13th, 20th, 23d, 27th, 28th.

Western Gulf.—1st, 3d, 4th, 7th, 8th, 9th, 11th, 12th, 13th, 16th to 20th, 22d, 27th.

Rio Grande valley.—9th, 20th.

Ohio valley.—1st, 3d to 12th, 14th, 16th, 17th 19th to 24th, 30th, 31st.

Tennessee.—1st to 4th, 7th to 14th, 16th to 22d, 24th, 27th.

Lower lakes.—1st to 31st.

Upper lakes.—1st to 31st.

Extreme northwest.—1st to 31st.

Upper Mississippi valley.—1st to 31st.

Missouri valley.—1st to 4th, 6th to 13th, 15th, 16th, 17th, 20th, 22d, 23d, 27th, 29th, 30th.

Northern slope.—1st to 31st.

Middle slope.—1st to 5th, 7th to 12th, 15th, 16th, 18th, 20th to 31st.

Southern slope.—7th, 8th, 16th, 19th, 20th.

Southern plateau.—1st to 20th, 23d, 25th, 30th, 31st.

Middle plateau.—1st to 21st, 24th, 29th, 30th, 31st.

Northern plateau.—1st to 18th, 26th, 27th, 31st.

North Pacific.—3d, 4th, 6th, 13th.

Frosts occurred at Sacramento, California, 10th, 16th, 19th, 31st.

The following instances of injury to vegetation by frosts have been reported:

Augusta, Georgia, 18th.—The farmers in this vicinity report that the recent frosts have done great injury to fruit-trees and garden vegetables.

Knoxville, Tennessee, 22d.—The snow storm of the night of the 21st and the freeze of this date are reported to have been injurious to the fruit-trees in this locality.

Grand Haven, Michigan, 19th.—It is feared that the peach-trees throughout this section have been killed by the recent cold weather.

At Charlotte, North Carolina, damaging frosts occurred on the 25th, 26th and 27th.

ICE.

The subject of the formation of ice in the northern sections is considered elsewhere in the REVIEW under the heading "Ice in Rivers and Harbors." The following instances of its formation in the southern states, have been reported:

Alabama.—Auburn, 12th, 16th, 19th.

Florida.—Jacksonville, 13th.

Georgia.—Atlanta, 12th, 13th, 16th, 20th; Augusta, 13th; Forsyth, 12th, 13th, 16th, 22d, 23d.

North Carolina.—Wilmington, 23d.

South Carolina.—Stateburg, 12th, 13th.

Texas.—Fort Concho, 19th.

PRECIPITATION.

[Expressed in inches.]

The distribution of rainfall over the United States and Canada, as determined from observations taken at more than five hundred stations, is exhibited on chart iv.

In the first column of the following table is given the average March rainfall in the various districts for several years; in the second column is given the average for March, 1883; and the third column shows the excess or deficiency of March, 1883, as compared with the average of previous years:

Average precipitation for March, 1883.

Districts.	Average for March. Signal-Service observa- tions.		Comparison of Mar., 1883, with the average for several years.
	For several years.	For 1883.	
	Inches.	Inches.	Inches.
New England.....	5.19	2.57	2.62 deficiency.
Middle Atlantic states.....	4.42	2.91	1.51 deficiency.
South Atlantic states.....	5.19	5.58	0.39 excess.
Florida peninsula.....	2.75	4.10	1.35 excess.
Eastern Gulf.....	5.64	3.99	1.65 deficiency.
Western Gulf.....	3.65	4.24	0.59 excess.
Rio Grande valley.....	1.18	2.88	1.70 excess.
Tennessee.....	5.98	4.33	1.65 deficiency.
Ohio valley.....	3.98	3.12	0.86 deficiency.
Lower lakes.....	2.95	1.60	1.35 deficiency.
Upper lakes.....	2.57	0.72	1.85 deficiency.
Extreme northwest.....	1.28	0.47	0.81 deficiency.
Upper Mississippi valley.....	2.58	0.90	1.68 deficiency.
Missouri valley.....	1.54	0.91	0.63 deficiency.
Northern slope.....	0.45	0.82	0.37 excess.
Middle slope.....	0.37	0.12	0.25 deficiency.
Southern slope.....	0.84	3.43	1.59 excess.
Northern plateau.....	1.04	1.87	0.83 excess.
Middle plateau.....	1.17	1.17	normal.
Southern plateau.....	0.58	1.29	0.71 excess.
North Pacific.....	6.22	3.71	2.51 deficiency.
Middle Pacific.....	2.96	3.10	0.14 excess.
South Pacific.....	0.86	1.44	0.58 excess.
Mount Washington, N. H.....	7.22	4.18	3.04 deficiency.
Pike's Peak, Colo.....	2.33	0.61	1.72 deficiency.

There has been a deficiency in the monthly rainfall over a large extent of country from the New England and middle Atlantic coasts westward to the Missouri river, and also in the east Gulf states, the middle slope, and on the north Pacific coast. In the districts east of the Mississippi river (embraced in the area of deficiency) the departures vary from 0.86 in the Ohio valley to 2.62 in New England, and they average about 1.65.

Table of Excessive, Greatest, and Least Monthly Rainfalls.

STATION.	SPECIALLY HEAVY.			Largest Monthly.	SMALLEST MONTHLY.	
	Date.	Amt.	Duration	Amount.	STATION.	Amt.
<i>Alabama.</i>					<i>Arizona.</i>	
Mobile.....	7, 8	2.39			Casa Grande.....	0.00
Mount Vernon Barracks.....	24, 25	2.05			Maricopa.....	0.00
<i>Arizona.</i>					Yuma.....	0.00
Fort Bowie.....	2, 3	2.04			Texas Hill.....	0.30
<i>California.</i>					<i>California.</i>	
Emigrant Gap.....				10.06	Mammoth Tank.....	0.00
Cisco.....				9.25	Mojave.....	0.00
Alta.....				9.06	Fort Yuma.....	1.00
Colfax.....				7.98	Indio.....	0.11
Summit.....				7.50	San Diego.....	0.41
Angel Island.....	26, 27	2.30			<i>Colorado.</i>	
Sacramento.....	26, 27	2.28			West Las Animas.....	0.15
Red Bluff.....	26, 27	2.22			Colorado Springs.....	0.17
Los Angeles.....	28, 29	2.10			Denver.....	0.21
San Francisco.....	26, 27	2.03			Fort Garland.....	0.50
Visalia.....	27, 28	1.52			<i>Dakota.</i>	
<i>Florida.</i>					Fort Sisseton.....	0.05
Punta Rassa.....	20	3.41		6.64	Fort Yates.....	0.14
Jacksonville.....	23	2.34			Fort Totten.....	0.19
Mayport.....	23	2.00			Tobacco Garden.....	0.19
Saint Augustine.....	24, 25	2.00			Rapid City.....	0.35
<i>Indiana.</i>					Bismarck.....	0.38
New Albany.....	29, 30	2.07			Huron.....	0.42
Worthington.....	29, 30	2.06			Fort Pembina.....	0.50
Hanover.....	30	2.00			<i>Idaho.</i>	
<i>Kansas.</i>					Eagle Rock.....	0.40
Pretty Prairie.....	24	2.73			<i>Illinois.</i>	
<i>Louisiana.</i>					Chicago.....	0.42
New Orleans.....	24	2.60			<i>Iowa.</i>	
Do.....	7, 8	2.29			Independence.....	0.20
Shreveport.....	24	2.37			Indianola.....	0.28
Port Eads.....	8, 9	2.03			Nora Springs.....	0.30
<i>Maryland.</i>					Guttenburg.....	0.31
Woodstock.....	30	2.70			Ames.....	0.32
<i>New Jersey.</i>					Dubuque.....	0.32
Cape May.....	10	2.45			Cresco.....	0.33
<i>North Carolina.</i>					Humboldt.....	0.43
Portsmouth.....	26, 27	6.55		10.30	<i>Kansas.</i>	
Hatteras.....	26	3.55		7.60	Salina.....	0.03
Chapel Hill.....	9	2.20		6.91	Ossawatimie.....	0.25
Do.....	26	3.74			Holton.....	0.38
Charlotte.....	25, 26	3.70		6.54	<i>Michigan.</i>	
Kittikawh.....	20	2.03		6.28	Fort Brady.....	0.30
Smithville.....	25, 26	2.99		6.13	Eacina.....	0.33
Fort Mason.....	26	2.88			Lansing.....	0.34
<i>Ohio.</i>					Kalamazoo.....	0.42
Marietta.....	19, 20	2.75			Coldwater.....	0.45
Cincinnati.....	29, 30	2.00			<i>Minnesota.</i>	
<i>Oregon.</i>					Saint Paul.....	0.06
Portland.....	26, 27, 28	5.29		6.40	Fort Snelling.....	0.07
Albany.....	26	2.47			Saint Vincent.....	0.11
<i>Tennessee.</i>					Minneapolis.....	0.32
Knoxville.....	30	2.06			Duluth.....	0.38
<i>Texas.</i>					Moorhead.....	0.38
New Ulm.....	24	6.12	9 h. 30 m.	13.13	<i>Montana.</i>	
Do.....	15	2.75			Glendive.....	0.09
Do.....	7	2.28			Fort Keogh.....	0.39
Eagle Pass.....	12, 13	4.18			<i>Nebraska.</i>	
Denison.....	24	2.47			Red Will. w.....	0.02
Palestine.....	24	2.27			Crete.....	0.10
Indianola.....	13	2.24	3 h. 44 m.		Table Rock.....	0.10
Coleman City.....	13	2.13			Milford.....	0.13
					Utica.....	0.15
					Fort Niobrara.....	0.24
					Inavale.....	0.25
					Stockham.....	0.30
					North Platte.....	0.47
					Peru.....	0.50
					<i>Nebraska.</i>	
					Otego.....	0.00
					Palisade.....	0.00
					Elko.....	0.07
					Reno.....	0.15
					Golconda.....	0.29
					Beowawe.....	0.32
					Wadsworth.....	0.35
					Hot Springs.....	0.45
					<i>New Mexico.</i>	
					Lordsburg.....	0.00
					Santa Fe.....	0.40
					<i>New York.</i>	
					Fort Hamilton.....	0.30
					<i>Ohio.</i>	
					Margaretta.....	0.44
					<i>Texas.</i>	
					Fort Elliott.....	0.04
					Rio Grande City.....	0.44
					<i>Utah.</i>	
					Blue Creek.....	0.62
					Terrace.....	0.18
					Kelton.....	0.20
					<i>Wisconsin.</i>	
					La Crosse.....	0.13
					Milwaukee.....	0.28
					Madison.....	0.32
					<i>Wyoming.</i>	
					Fort Washakie.....	0.35
					Cheyenne.....	0.35

In the south Atlantic states, Florida, the west Gulf states, northern and southern slopes, and west of the Rocky mountains, the monthly rainfall is in excess of the March average. In Florida, the Rio Grande valley, and southern slope, the depart-

ures average about 1.55; in the south Atlantic states, northern slope, and the districts west of the Rocky mountains, the departures average about 0.50. On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the monthly rainfalls are 3.04 and 1.72 below the average, respectively.

The following figures show the rainfall for the districts on the Pacific coast for the past four months, from December, 1882 to March, 1883, both inclusive, and the departures of each month from the averages—the plus and minus signs denoting above and below the average respectively.

Districts.	Average of season, Dec. to Feb., several years.	For season, Dec. to Feb., 1882-3.	Departure.	Departures of the respective months.			
				Dec., 1882.	Jan., 1883.	Feb., 1883.	Mar., 1883.
North Pacific.....	28.03	26.26	-1.77	+6.87	-0.73	-5.40	-2.51
Middle Pacific.....	19.09	7.15	-11.94	-4.14	-4.14	-3.80	+0.14
South Pacific.....	6.76	3.87	-2.89	-1.44	-1.38	-0.65	+0.58

It will be seen from the above statement that there has been a large deficiency in the rainfall in California during December, January and February, and also in the north Pacific coast region during January, February and March.

The rainfall of March, 1883, has been above the average in California, but on the north Pacific coast there has been a deficiency of 2.51, although at Portland, Oregon, the rainfall was but slightly below the March average.

The rains of the latter part of the month terminated the serious drought which prevailed in California, and were sufficient to assure the success of the wheat crop, and to greatly improve the pasturage of that State.

The following table has been prepared to show the districts of maximum departures from the average rainfall, with brief remarks upon its distribution, for the month of March, since 1874. The plus (+) and minus (-) signs denote above and below the average, respectively:

Year.	Districts.	Excess or deficiency.	Remarks.
1874	Gulf states.....		Deficient along the Atlantic coast and in the lower lakes; largely in excess in the Gulf states, and slightly excessive in the Missouri valley; normal in upper Mississippi valley, upper lakes, and Saint Lawrence valley.
1875	Tennessee.....	+ 5.76	Excessive in the middle and south Atlantic states, the Gulf states, and from Tennessee to the upper lakes; deficient in the Saint Lawrence valley and lower lakes.
	South Atlantic states.....	+ 2.34	
	Saint Lawrence valley.....	- 0.94	
1876	Western Gulf.....	+ 5.05	Excessive in all districts, except normal in Minnesota, and small deficiency in south Atlantic states.
	New England.....	+ 3.90	
	Middle Atlantic states.....	+ 2.85	
	Pacific coast region.....	+ 2.55	
	South Atlantic states.....	- 0.80	
1877	Saint Lawrence valley.....	+ 2.75	Excessive in all districts east of the Rocky mountains, except slight deficiencies in the western Gulf, upper Missouri valley, and in Minnesota.
	New England.....	+ 4.50	
	Western Gulf.....	- 0.70	
1878	South Atlantic states.....	- 2.57	Slightly excessive over all the northern districts from New England to the Pacific, and deficient in the southern districts.
	Eastern Gulf.....	- 1.36	
	Lower lakes.....	+ 1.25	
1879	New England.....	+ 1.10	Below the average in all districts, except on the Pacific coast and in New England.
	California coast.....	+ 2.32	
	Portland, Oregon.....	+ 3.44	
	Eastern Gulf.....	- 3.82	
	Western Gulf.....	- 3.25	
	South Atlantic states.....	- 2.05	
1880	Eastern Gulf.....	+ 3.32	Excessive in the middle Atlantic and Gulf states, Tennessee and southern California; deficient in the Saint Lawrence valley, New England, south Atlantic states, Florida, and from the Ohio valley and lake region westward to the Pacific.
	Tennessee.....	+ 2.30	
	North Pacific coast.....	- 2.20	
	Middle Pacific.....	- 1.51	
	New England.....	- 1.89	
1881	North Pacific coast.....	- 4.94	Excessive in the lake region, eastern Gulf, New England and middle Atlantic states, and south Pacific coast region; below the average in all other districts.
	Middle Pacific coast.....	- 2.46	
	Western Gulf.....	- 2.55	
	New England.....	+ 1.67	
	Upper lakes.....	+ 0.98	
1882	Ohio valley.....	+ 1.64	Deficient along the Gulf coast, in New England, middle states, Missouri valley, north Pacific coast, and at Rocky mountain stations; excessive in the lake region, Tennessee, the Ohio and upper Mississippi valleys, the extreme northwest, and south Atlantic states.
	Tennessee.....	+ 1.13	
	Florida.....	- 2.10	
	Eastern Gulf.....	- 2.12	
	North Pacific coast.....	- 4.37	

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the table of average precipitation. The Chief Signal Officer is indebted to voluntary observers for the following notes upon this subject. As some of these comparisons are made with the averages determined from records covering periods extending back many years before the establishment of the Signal Service, they will be found of special interest:—

Illinois.—Anna: monthly rainfall 3.93, or 0.27 below the March average of seven years.

Morrison: monthly rainfall 0.86, or 2.23 below the March average of last nine years. The largest March rainfall of that period, 8.09, occurred in 1876; the smallest is that of 1883.

Indiana.—Wabash: monthly rainfall 1.21, or 2.02 below the March average of six years.

Kansas.—Yates Centre: monthly rainfall 0.58, or 1.05 below the March average of three years. Wellington, monthly rainfall 1.14, or 0.14 below the March average of four years. Lawrence, monthly rainfall 1.28, or 0.96 below the average of fifteen years. During that period the largest March rainfall, 4.51, occurred in 1876; the smallest, 1.15, occurred in 1869.

Maine.—Gardiner: monthly rainfall, 2.24, is 1.67 below the March average of forty-seven years. The amount of rainfall for January, February and March, 1883, is 7.62, or 5.87 below the average of the corresponding months of forty-seven years.

Maryland.—Fallston: monthly rainfall, 3.23, is 1.15 below the March average of thirteen years. The largest March rainfall of that period, 8.75, occurred in 1876; the smallest, 1.79, in 1874.

Massachusetts.—Worcester: monthly rainfall, 1.91, is 1.61 below the March average. The rainfall for the three months

ending March 31st is 9.30, or 1.25 below the average of the corresponding months. The amount of snowfall, 10.25 inches, is about the average of March.

New Hampshire.—Grafton: monthly rainfall, 2.07, is 0.88 below the March average of three years. Antrim: monthly rainfall 2.20, or 2.33 below the March average of ten years.

New Jersey.—South Orange: monthly rainfall, 1.77, is 2.10 below the March average of thirteen years.

New York.—Palermo: monthly rainfall, 1.20, is 1.90 below the March average of the last thirty years. The largest March rainfall of that period, 7.00, occurred in 1859; the smallest is that of 1883. The amount of snowfall, 10.5 inches, is four inches below the average of March. During March 1870, 37 inches of snow fell; in 1882 the amount was 2.5 inches, the extremes occurring in these years. North Volney: monthly rainfall, 2.15, is 1.01 below the March average of eleven years. The largest March rainfall of that period, 6.97, occurred in 1873; the smallest 2.00, occurred in 1879.

Texas.—New Ulm: monthly rainfall, 13.13, is 7.43 above the March average of eleven years. During that period the smallest March rainfall, 2.25, occurred in 1877; the largest is that of March, 1883.

Vermont.—Woodstock: monthly rainfall 2.08, or 1.09 below the March average of the last fourteen years. The largest March rainfall of that period, 6.71, occurred in 1876; the smallest, 1.28, occurred in 1874. The largest March snowfall of a period of twenty-two years, 41.55 inches, fell in 1873; the smallest, 5.05, fell in 1878.

The following table, furnished by Miss M. E. Wing, of Charlotte, Vermont, shows the rainfall of each month at that place, with the exception of April, 1880, since May, 1868, with the annual sums and monthly averages:

Month.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	Monthly means for the series.
January.....		1.00	2.00	1.50	0.70	4.60	2.50	1.50	1.70	2.20	1.80	2.30	1.60	2.50	0.90	1.92
February.....		4.10	4.80	2.00	2.40	1.40	1.50	1.70	3.20	0.20	1.30	1.40	1.40	1.20	1.70	2.02
March.....		5.30	2.10	5.50	1.20	4.30	1.40	2.70	3.30	3.80	1.20	2.50	1.10	1.90	2.40	2.76
April.....		3.50	3.30	6.10	0.00	1.40	3.70	1.50	1.40	2.20	2.40	3.30	0.60	1.00	2.38
May.....	7.40	6.30	0.70	2.90	3.00	1.20	3.70	3.20	1.40	0.60	1.70	0.50	1.40	2.60	2.40	2.60
June.....	3.30	6.10	6.90	3.00	3.30	2.40	3.30	3.00	1.70	2.80	1.40	2.50	1.40	1.60	3.20	3.06
July.....	3.20	3.80	3.30	9.00	5.00	3.90	0.40	2.10	2.10	6.00	2.60	2.20	1.40	2.70	2.20	3.73
August.....	1.00	4.60	3.30	6.30	9.40	2.40	1.30	1.70	2.60	2.30	5.60	1.70	1.10	2.80	1.90	3.10
September.....	4.40	3.90	3.00	2.90	4.00	1.70	3.30	4.90	1.20	0.60	1.70	3.00	2.90	2.30	7.50	3.19
October.....	1.90	11.40	5.70	5.00	4.20	6.00	1.00	3.90	5.00	3.50	3.50	0.70	4.00	1.40	1.10	3.89
November.....	8.90	1.50	2.50	3.30	3.20	3.30	2.70	3.00	0.60	2.90	2.70	4.00	2.30	1.00	3.00	2.99
December.....	1.90	4.20	1.80	2.00	2.10	1.80	0.50	0.90	1.40	1.10	4.00	1.40	1.00	2.10	2.90	1.94
Annual sums.....	32.00	55.70	40.00	49.60	39.10	34.40	32.30	30.10	25.60	28.20	29.30	24.50	19.60	22.70	30.20	33.98
Monthly means for each year.....	4.00	4.64	3.33	4.13	3.26	2.87	2.69	2.51	2.13	2.35	2.44	2.04	1.78	1.89	2.52	2.80

* Annual average of thirteen years.

† General monthly average.

Virginia.—Variety Mills: monthly rainfall, 3.04, is 0.53, below the average of the last four years. Wytheville: monthly rainfall, 4.41, is 1.41 in excess of the March average of a period of nineteen years.

West Virginia.—Helvetia: monthly rainfall, 5.37, is 0.31 above the March average of seven years.

The following table shows the greatest and least number of rainy (upon which rain fell) and cloudy days, the percentages of mean relative humidity, and the dew-point, as reported from the various districts:

HAIL.

Fort Concho, Texas, 15th.—Heavy thunder-storm accompanied by rain and hail; hailstones, measuring from one-half to three-fourths of an inch in diameter, fell from 12.18 to 12.33 p. m.

Uvalde, Texas, 23d.—A terrific hail storm, accompanied by rain and high north wind, occurred at 7.40 p. m. The hailstones were the size of hazel-nuts and did considerable damage to shrubbery and other vegetation. The storm was of about twenty minutes duration.

San Antonio, Texas.—During the night of the 23d a severe

wind and rain storm prevailed over western Texas, flooding the country and causing the streams to rise rapidly. In some sections very large hail-stones fell. Trees, fences and light buildings were blown down. The river at San Antonio rose to a higher point than has been known for many years.

Cairo, Illinois, 29th.—Hail-stones the size of peas fell here at about 10.30 p. m. Three miles west of station the storm was more severe, the hail-stones being as large as walnuts.

Litchfield, Illinois, 29th.—A heavy hail storm of short duration was experienced here during the afternoon.

Hail storms of less violence have been reported as follows:

Arizona.—Fort Bowie, 18th; Phoenix, 15th; Prescott, 13th, 23d.

California.—Sacramento, 30th; San Francisco, 30th; Cape Mendocino, 30th.

Connecticut.—Southington, 20th.

Idaho.—Fort Lapwai, 28th.

Georgia.—Atlanta, 25th.

Illinois.—Anna, 30th.

Indiana.—Lafayette, 14th.

Iowa.—Monticello, 5th.

Kansas.—Fort Scott, 21st, 22d, 29th, 30th; Salina, 31st.

Maryland.—Sandy Springs, 30th.
Massachusetts.—Cambridge, 18th, 22d.
Missouri.—Protem, 19th.
Nevada.—Pioche, 29th 30th, 31st; Fort McDermitt, 29th.
New York.—Factoryville, 19th.
North Carolina.—Brevard, 2d, 9th, 30th; Weldon, 3d, 26th;
 Ore Knob, 9th; Wilmington, 30th.
Ohio.—Bethel, 31st; College Hill, 19th; Jacksonburg, 19th.
Oregon.—Umatilla, 28th; Roseburg, 30th, 31st.
Pennsylvania.—Wellsboro', 19th; Fallsington, 30th; West
 Chester, 30th.
Texas.—Brackettsville, 23d; Jacksboro', 23d; Palestine, 24th.
Utah.—Coalville, 24th.
Virginia.—Marion, 15th; Wytheville, 30th.
Washington Territory.—Spokane Falls, 27th; Pomeroy, 28th.
West Virginia.—Morgantown, 14th.
Wyoming.—Fort Washakie, 30th.

Table of rainy and cloudy days, relative humidity and dew-point for
 March, 1883.

Districts.	Rainy days	Cloudy days	Rel. humidity. *	Dew-point
			Percentages.	
New England.....	From 6 to 19	From 4 to 12	From 57.7 to 70.8	From 15.1 to 23.2
Middle Atlantic states..	" 7 " 14	" 3 " 11	" 50.5 " 74.6	" 10.6 " 31.9
South Atlantic states..	" 9 " 15	" 4 " 10	" 58.0 " 88.8	" 30.2 " 47.1
Florida peninsula.....	" 5 " 8	" 6 " 8	" 71.9 " 72.6	" 51.2 " 63.0
Eastern Gulf.....	" 6 " 18	" 6 " 12	" 58.9 " 71.1	" 38.7 " 48.6
Western Gulf.....	" 7 " 19	" 6 " 13	" 60.0 " 83.0	" 33.9 " 58.5
Rio Grande valley.....	" 2 " 13	" 9 " 11	" 67.9 " 81.2	" 51.5 " 60.7
Ohio valley and Tenn..	" 10 " 21	" 7 " 14	" 58.2 " 71.5	" 20.7 " 36.8
Lower lakes.....	" 8 " 21	" 8 " 13	" 55.9 " 78.6	" 17.0 " 23.0
Upper lakes.....	" 7 " 16	" 5 " 10	" 59.5 " 80.6	" 7.5 " 21.0
Extreme northwest.....	" 6 " 14	" 0 " 11	" 74.2 " 83.9	" 4.9 " 14.3
Upper Mississippi valley	" 6 " 16	" 5 " 12	" 57.8 " 83.8	" 14.2 " 33.5
Missouri valley.....	" 8 " 18	" 7 " 11	" 62.7 " 71.5	" 16.6 " 29.9
Northern slope.....	" 3 " 14	" 7 " 11	" 47.7 " 82.3	" 17.3 " 32.1
Middle slope.....	" 2 " 7	" 3 " 5	" 48.5 " 52.0	" 19.2 " 28.7
Southern slope.....	" 5 " 13	" 3 " 12	" 53.4 " 70.0	" 33.2 " 43.7
Southern plateau.....	" 2 " 13	" 2 " 10	" 46.5 " 68.2	" 23.8 " 42.8
Middle plateau.....	" 5 " 11	" 8 " 10	" 45.5 " 46.9	" 24.3 " 26.3
Northern plateau.....	" 5 " 11	" 1 " 10	" 45.5 " 72.8	" 24.3 " 26.2
North Pacific.....	" 8 " 10	" 8 " 10	" 69.5 " 80.9	" 40.1 " 41.5
Middle Pacific.....	" 5 " 8	" 4 " 15	" 50.9 " 84.3	" 42.2 " 47.1
South Pacific.....	" 2 " 11	" 3 " 13	" 56.0 " 80.2	" 42.6 " 50.3
Mt. Washington, N. H..	Sixteen	One	" 96.9	" 0.2
Pike's Peak, Col.....	Fourteen	Four	" 81.4	" 8.2

* Relative humidity corrected for altitude.

SNOW.

The dates on which snow is reported to have fallen in the various districts are as follows:—

New England.—2d to 15th, 17th to 21st, 23d to 28th, 30th, 31st.

Middle Atlantic states.—3d, 4th, 6th, 7th, 10th to 13th, 15th, 16th, 19th, 20th, 23d to 31st.

South Atlantic states.—8th, 21st, 22d, 23d, 25th.

Ohio valley.—1st, 3d to 7th, 9th, 10th, 11th, 15th, 16th, 17th, 19th to 31st.

Tennessee.—19th to 22d.

Lower lakes.—2d to 13th, 15th to 24th, 26th to 29th.

Upper lakes.—2d to 23d, 25th to 28th.

Extreme northwest.—1st to 6th, 8th to 11th, 14th to 22d, 24th to 27th, 29th, 30th, 31st.

Upper Mississippi valley.—2d, 5th, 6th, 9th, 11th, 15th, 16th, 18th to 30th.

Missouri valley.—2d, 5th, 6th, 9th, 10th, 14th, 15th, 18th to 31st.

Northern slope.—4th to 9th, 16th to 31st.

Middle slope.—1st, 3d, 4th, 5th, 12th to 16th, 18th, 19th, 21st, 24th to 31st.

Southern plateau.—3d, 4th, 12th, 15th, 18th, 19th, 23d, 30th, 31st.

Middle plateau.—3d, 4th, 13th, 14th, 15th, 18th, 24th, 29th, 30th, 31st.

Northern plateau.—25th to 31st.

Snow also fell in the following states not included in the districts named above:

Arkansas.—Fort Smith, 15th.

Texas.—Fort Davis, 7th.

The following are reports of heavy snow storms, causing interruption, to railway travel, etc.

Huron, Dakota, 2d.—The first through trains from the east since February 19th arrived on this date.

Humboldt, Iowa.—The Minneapolis and Saint Louis division of the Rock Island railroad was blockaded north of this station from the 6th to 8th.

Rochester, New York, 7th.—Eastern trains were delayed by snow-drifts.

Montreal, Quebec.—The snow storm of the night of the 6th–7th, was the heaviest of the season; the depth of snow in the streets was fully five feet. Reports from Toronto, Ontario, and other points state the storm was generally severe throughout Ontario, delaying travel on the various railroads.

Saint Paul, Minnesota, 9th.—The severest snow storm of the season is reported from points along the line of the Northern Pacific railroad. Freight business west of Fargo, Dakota, was entirely suspended and the passenger trains were run with great difficulty. At Grafton, Dakota, business was entirely suspended during the day.

Waterloo, Quebec.—A very severe snow storm prevailed during the 10th and 11th. The railroads were blockaded with snow, making all kinds of traffic impossible.

Toledo, Ohio, 18th.—Very heavy snow storm, causing suspension of street railway travel. Trains on the various railroads running into the city were delayed during the 18th and 19th. In the counties adjacent to Toledo, snow fell to a depth of fourteen inches.

Richmond, Vermont, 20th.—Very heavy snow storm; railroads blockaded and mails delayed.

East Tawas, Michigan.—The heaviest snow storm of the season occurred on the night of the 22d–23d, blockading the railroads and interrupting travel.

Toronto, Ontario.—A heavy snow storm prevailed throughout the provinces on the 23d. At Toronto snow fell to a depth of six inches, and was reported from other points to be from twelve to eighteen inches deep.

Fort Benton, Montana, 26th.—Severe snow storm; all coaches snow-bound and transportation delayed.

Ashland, Pennsylvania, 30th.—A heavy snow storm prevailed on this date throughout the Schuylkill, Northumberland, and Luzerne regions, and also in Berks, Lehigh, and adjoining counties. In the vicinity of Ashland the snow was nine inches deep, and from five to six inches throughout the eastern counties of the state.

LARGEST MONTHLY SNOWFALLS.

[Expressed in inches.]

The following are the largest monthly snowfalls reported from the various states and territories during the month:—

California.—Summit, 72; Cisco, 34; Emigrant Gap, 25; Fort Bidwell, 7.6; Alta, 4.

Colorado.—Fort Lewis, 10; Pike's Peak, 6.1.

Connecticut.—New London, about 15; Southington, 13; Bethel, 10.

Dakota.—Fort Randall, 23; Fort Meade, 20; Fort Hale, 12.1; Morrison, 11; Fort Buford, 9.1; Alexandria, 8.6; Fort Lincoln, 7; Fort Stevenson, 6.7; Fort Bennett, 6.4; Fort Sully, about 6; Fort Pembina, 5; Fort Garland, about 5.

Delaware.—Delaware Breakwater, 9.5.

District of Columbia.—Washington, about 8; West Washington, 7.

Illinois.—Riley, 10.75; Morrison, 7; Champaign, about 5.5; Rockford, 5.

Indiana.—Indianapolis, about 15; Lafayette, 7.5; Glenwood, 7; Wabash, 6.5; Fort Wayne, 5.5.

Iowa.—Logan, 10; Monticello, 6; Cedar Rapids, 5.8; Muscatine, 5; Des Moines, about 4.5; Nora Springs, 4.

Maine.—Eastport, about 22.5; Cornish, 18; Dexter, 12; Gardiner, 10; Orono, 7.5; Fort Preble, about 4.

Maryland.—Cumberland, 11; Fort McHenry, about 10; Sandy Springs, 9; Emmitsburg, 8.5; Fallston, about 8; Baltimore, about 6; Woodstock, about 6.

Massachusetts.—Rowe, 12; Princeton, 11.9; Somerset, 8.5;

Fall River, 7; Amherst, 6; Westborough, 5.75; Milton, 5; Mendon, 4.

Michigan.—East Tawas, 35; Port Huron, 28.6; Thornville, 17; Detroit, about 15; Traverse City, 14; Northport, 13.15; Mackinaw City, 12.5; Harrisonville, 12; Hillsdale, 99; Lansing, 8.75; Alpena, 66; Swartz Creek, 6.5; Marquette, 6.1; Coldwater, 4.5; Grand Haven, about 4.

Missouri.—Protem, 6.5; Jefferson Barracks, 4.

Montana.—Fort Missoula, 13.8; Billings, 11.3; Fort Assiniboine, 10; Fort Shaw, 8.5; Poplar River, 7.4; Helena, 7.3.

Nebraska.—Fremont, 7.25; Clear Creek, 6.75; Genoa, 6.2; De Soto, 5.75; Fort Niobrara, 4.8.

Nevada.—Truckee, 10; Boca, 7.

New Hampshire.—Mount Washington, about 40; Grafton, 18; Antrim, 13.

New Jersey.—Cape May, about 14; Caldwell, 11; Paterson, 11; South Orange, 10.25; Freehold, 9.4; Bordentown, 8.75; Cumberland, 8.5; Sandy Hook, about 8; Somerville, 6.5; Moorestown, 4.25; Vineland, 4.

New York.—Johnstown, 19; Friendship, 16.75; Plattsburg Barracks, about 16; Port Jervis, 15; Albany, about 15; Rochester, about 14; West Point, about 13; Kiantone, 12.75; Cooperstown, 12; Ithaca, 11.5; Fort Columbus, 11.2; New York City, about 11; Menand Station, (near Albany,) 10.75; Palermo, 10.50; White Plains, 10; Ardenia, 10; Hector, 9; Buffalo, 8.6; Flushing, 8; Fort Niagara, about 8; Madison Barracks, about 8; Oswego, about 8; Mountainville, 7.8; Factoryville, 6.9; Penn Yan, 6.9.

North Carolina.—Ore Knob, 13; Lenoir, 9; Brevard, 7; Highlands, 5; Chapel Hill, 4.25.

Ohio.—Canal Dover, 15; Jacksonburg, 13; North Lewisburg, 12; Ruggles, 12; Cleveland, 11.7; Columbus, about 8; Toledo, 6.5; Westerville, 6; College Hill, 4.75; Marion, 4.

Pennsylvania.—Catawissa, 20; Grampian Hills, 19; Dyberry, 18; Pittsburgh, about 18; Williamsport, 17.7; Chambersburg, 16.45; Wellsboro', 14.61; Erie, 12.5; Blooming Grove, 11.6; Meadville, 10; Fallsington, 9.15; West Chester, 8.75.

Rhode Island.—Newport, about 9.

Utah.—Fort Douglass, 5.

Vermont.—Newport, 45.25; Charlotte, 23; Lunenburg, 21; Strafford, 21; Woodstock, 19.

Virginia.—Wytheville, 15.5; Marion, 10; Accotink, 8.75.

West Virginia.—Helvetia, 8.25.

Wisconsin.—Franklin, 12; Manitowoc, 10.25; Beloit, 5.06; Embarrass, 4.5; Ripon, 3.78.

Wyoming.—Cheyenne, about 8; Fort Bridger, about 7.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches.]

Colorado.—Pike's Peak, 6; Colorado Springs, 0.25.

Connecticut.—Bethel, 2; New Haven, 2; New London, 2; Southington, 2.

Dakota.—Fort Stevenson, 6; Alexandria, 4; Fort Bennett, 3; Morrison, 2; Bismarek, 1; Huron, trace; Yankton, trace.

District of Columbia.—Washington, 4.5; West Washington, 3.5.

Illinois.—Morrison, trace; Riley, trace.

Indiana.—Indianapolis, trace.

Iowa.—Cresco, in drifts; Humboldt, few drifts; Cedar Rapids, trace; Dubuque, trace; Guttenburg, trace; Monticello, trace; Nora Springs, trace.

Maine.—Gardiner, 22; Eastport, 5; Orono, 3; Portland, trace.

Maryland.—Sandy Springs, 2.5; Woodstock, 1; Fallston, trace; Emmittsburg, trace.

Massachusetts.—Rowe, 24; Fall River, 2; Somerset, about 2; Milton, 1.

Michigan.—Northport, 18; Traverse City, 18; Marquette, 6; East Tawas, 4; Mackinaw City, 4; Escanaba, 2.5; Alpena, trace; Grand Haven, trace; Hillsdale, trace; Port Huron, trace.

Minnesota.—Moorhead, 10; Saint Vincent, 2; Duluth, about 2; Northfield, in drifts; Saint Paul, trace.

Montana.—Fort Assiniboine, 10; Billings, 7; Helena, 6;

Benton, 5; Fort Keogh, 3; Fort Shaw, 3; Fort Missoula, 1; Poplar River, trace.

Nebraska.—Stockham, 1; North Platte, trace; Omaha, trace.

New Hampshire.—Mount Washington, 60; Grafton, 30.

New Jersey.—Freehold, 4; Paterson, 4; South Orange, 4; Sandy Hook, 3; Somerville, 3; Bordentown, 2; Cape May, trace.

New York.—North Volney, 28 in the woods, trace to drifts of 4 in the fields; Palermo, 18; Johnstown, 12; Mountainville, 7.8; Cooperstown, 6; Flushing, 2; Oswego, 1; Friendship, drifts in the woods; Ithaca, trace; Kiantone, trace; Rochester, trace, White Plains, trace.

Ohio.—Canal Dover, 4; Cleveland, trace; Marion, trace; Toledo, trace.

Pennsylvania.—Grampian Hills, 19; Dyberry, 2 to 24; Wellsboro', 4.2; Williamsport, 3; Fallsington, 2.5; Chambersburg, trace; Leedsdale, trace.

Rhode Island.—Newport, 1 to 2; Block Island, 1.5.

Utah.—Salt Lake City, trace.

Vermont.—Strafford, 30; Woodstock, 25; Newport, 3; Charlotte, 1 to 2.

Virginia.—Accotink, 5; Variety Mills, 0.75.

West Virginia.—Morgantown, 1.

Wisconsin.—Embarrass, 18 in the forests, 8 in the fields; Ripon, 4; La Crosse, 2; Beloit, trace.

Wyoming.—Cheyenne, 0.25.

SNOW FROM A CLOUDLESS SKY.

Bismarek, Dakota, 8th.—At 9.30 p. m. light snow fell when the sky was entirely clear, with the exception of a low bank of clouds on the northern horizon.

Louisville, Kentucky, 10th.—Snow fell from a cloudless sky from 10.30 to 10.42 p. m.

SLEET.

California.—Fort Bidwell, 30th.

Dakota.—Fort Sully, 28th, 31st; Rapid City, 29th.

Georgia.—Augusta, 8th.

Illinois.—Cairo, 19th; Springfield, 5th, 18th, 19th.

Indiana.—Indianapolis, 22d; Logansport, 5th, 18th; Wabash, 18th.

Iowa.—Burlington, 6th; Davenport, 5th, 6th, 25th, 29th; Guttenburg, 25th; Humboldt, 5th.

Kansas.—Creswell, 2d, 4th; Fort Scott, 21st; Ossawatimie, 27th, 28th; Yates Centre, 23d.

Kentucky.—Louisville, 19th.

Maine.—Eastport, 10th, 13th.

Maryland.—Emmittsburg, 10th.

Missouri.—Saint Louis, 19th.

Nebraska.—Omaha, 24th.

New Hampshire.—Mount Washington, 20th.

New Jersey.—Freehold, 6th, 30th.

New Mexico.—Santa Fé, 24th.

New York.—Albany, 19th, 20th; Kiantone, 19th; Oswego, 19th; West Point, 10th.

North Carolina.—Charlotte, 25th, 26th; Wilmington, 8th.

Ohio.—Cincinnati, 19th.

Pennsylvania.—Chambersburg, 30th; West Chester, 30th.

South Carolina.—Stateburg, 8th.

Tennessee.—Chattanooga, 24th, 25th; Nashville, 19th, 24th.

Texas.—Indianola, 13th.

Vermont.—Burlington, 18th, 19th, 29th.

Virginia.—Chincoteague, 20th, 31st; Lynchburg, 31st; Variety Mills, 9th, 28th, 30th.

Washington.—Spokane Falls, 28th.

WINDS.

The prevailing directions of the wind for the month of March, 1883, at the Signal Service stations, are shown on chart iii., by arrows flying with the wind. Over the northern and central parts of the country, the prevailing winds were generally from the northwest; in the Carolinas they were from the southwest, except at Kittyhawk and Hatteras where they were northeast;

in the Gulf states they were variable; on the California coast they were west, except southeast at Cape Mendocino.

TOTAL MOVEMENTS OF THE AIR.

[In miles.]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England.....	Block Island, R. I.....	13,502	New London, Conn.....	6,033
Middle Atlantic states.	Del. Breakwater, Del.....	14,133	Lynchburg, Va.....	3,859
South Atlantic states.	Hatteras, N. C.....	14,708	Augusta, Ga.....	2,647
Florida peninsula.....	Punta Rassa.....	8,210	Cedar Keys.....	6,805
East Gulf.....	Starkville, Miss.....	6,951	Mobile, Ala.....	4,442
West Gulf.....	Indianola, Tex.....	9,801	Denison, Tex.....	4,133
Rio Grande valley.....	Brownsville, Tex.....	7,061	Eagle Pass, Tex.....	4,134
Ohio valley.....	Champaign, Ill.....	11,486	Cincinnati, Ohio.....	5,254
Tennessee.....	Knoxville.....	5,942	Memphis, Tenn.....	4,891
Lower lakes.....	Sandusky, Ohio.....	11,824	Detroit, Mich.....	7,025
Upper lakes.....	Milwaukee, Wis.....	10,369	Chicago, Ill.....	6,704
Extreme northwest.....	Moorhead, Minn.....	9,901	Bismarck, Dak.....	7,193
Upper Mississippi valley	Saint Louis, Mo.....	8,530	Dubuque, Iowa.....	3,580
Missouri valley.....	Huron, Dak.....	7,393	Yankton, Dak.....	5,726
Northern slope.....	Cheyenne, Wyo.....	7,438	Helena, Mont.....	4,450
Middle slope.....	Fort Elliott, Tex.....	8,649	Denver, Colo.....	3,928
Southern slope.....	Fort Stockton, Tex.....	6,541	Fort Davis, Tex.....	4,630
Southern plateau.....	Santa Fe, N. Mex.....	6,839	Silver City, N. Mex.....	2,576
Middle plateau.....	Salt Lake City, Utah.....	5,010	Pioche, Nev.....	4,136
Northern plateau.....	Eagle Rock, Idaho.....	5,759	Lewiston, Idaho.....	1,732
North Pacific.....	Portland, Oreg.....	2,750	Olympia, Wash.....	932
Middle Pacific.....	Cape Mendocino, Cal.....	10,606	Sacramento, Cal.....	4,688
South Pacific.....	San Diego, Cal.....	4,288	Visalia, Cal.....	2,489

* Record from 1st to 26th, inclusive.

On the summit of Mount Washington, New Hampshire, the total movement was 34,800, which is the largest monthly movement ever recorded at this station, but the average daily movement was 34.6 miles less than for the twenty-eight days of February.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire, velocities exceeding 50 miles per hour were recorded on every day of the month, with the exception of the 21st, 23d and 27th, and they exceeded 75 miles per hour as follows: 84, nw., 5th; 80, se., 6th; 100, nw., 7th; 112, nw., 8th; 84, e., 10th; 108, nw., 11th; 92, nw., 12th; 80, nw., 13th; 96, w., 14th; 114, nw., 15th; 84, w., 18th; 100, sw., 19th; 80, s., 20th; 92, nw., 24th; 150 (maximum) nw., 25th; 80, nw., 28th.

On the summit of Pike's Peak, Colorado, the highest velocity, 76 miles, nw., occurred on the 18th, when the anemometer was broken. No record was kept from the 1st to 3d inclusive, or after the 18th.

At Cape Mendocino, California, a hurricane began on the 25th and continued with great violence until the 28th. A wind-velocity of 66 miles per hour was recorded at 5.35 p. m. of the 25th, when the anemometer was blown away, the wind attaining an estimated velocity of 100 miles. During a lull in the storm, the instrument was replaced, but was again blown away on the 26th; the velocity at this time was probably not less than 125 miles—80 miles having been recorded before the instrument was broken. During an abatement in the storm on the morning of the 29th, the anemometer was again replaced, but at 1.15 p. m. was broken after recording 76 miles. On this date the storm reached its maximum violence at about 8.15 p. m., when the velocity of the wind was estimated at 100 miles per hour.

Other high winds have been reported as follows:

Kittyhawk, North Carolina, 60, n., 15th and 16th; 53, ne., 20th; 56, ne., 26th and 27th. Portsmouth, North Carolina, 56, nw., 16th; 69, ne., 26th; 49, ne., 27th. Hatteras, North Carolina, 52, ne., 16th; 60, ne., 26th. Billings, Montana, 60, nw., 17th. Fort Assinniboine, Montana, 50, w., 17th. Fort Benton, Montana, 52, ne., 17th. Fort Shaw, Montana, 52, sw., 17th. Fort Maginnis, Montana, 52, nw., 6th. Fort Elliott, Texas, 52, nw., 18th. Fort Stevenson, Dakota, 64, n., 9th. Bismarck, Dakota, 50, nw., 9th. Fort Bennett, Dakota, 60, nw., 9th. Indianola, Texas, 54, ne., 7th. Galveston, Texas, 61, n., 13th. Champaign, Illinois, 51, n., 18th. Block Island, Rhode

Island, 55, ne., 10th. Cape May, New Jersey, 56, nw., 11th; Delaware Breakwater, Delaware, 52, nw., 7th. Cape Henry, Virginia, 52, nw., 15th.

LOCAL STORMS.

Galveston, Texas, 13th.—A gale began at 2.34 p. m., the wind reaching a velocity of sixty-one miles. The storm was apparently of local character, and resulted in no damage in this locality.

New Orleans, Louisiana.—A storm began at 1 p. m., accompanied by heavy rain; the wind attained its highest velocity at 3.10 p. m., blowing down fences, trees, etc., and doing other damage.

Fort Yates, Dakota, 8th.—During a storm of this date the instrument-shelter was blown from the building, for a distance of fifty yards.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for March, 1883, with the telegraphic reports for the succeeding twenty four hours, shows the general average percentage of verifications to be 90.27 per cent. The percentages for the four elements are: Weather, 90.66; direction of the wind, 88.47; temperature, 91.66; barometer, 90.28 per cent. By geographical districts, they are: For New England, 88.31; middle Atlantic states, 89.54; south Atlantic states, 90.59; eastern Gulf, 92.76; western Gulf, 91.14; lower lakes, 90.93; upper lakes, 88.38; Ohio valley and Tennessee, 91.37; upper Mississippi valley, 89.46; Missouri valley, 89.75; north Pacific, 89.29; middle Pacific, 95.65; south Pacific, 94.57.

There were eighty-two omissions to predict (twenty-six being due to the absence of reports from the Pacific coast) out of 3,813, or 2.15 per cent. Of the 3,731 predictions that have been made, fifty-nine, or 1.47 per cent., are considered to have entirely failed; fifty-three, or 1.42 per cent., were one-fourth verified; three hundred and nineteen, or 8.55 per cent., were one-half verified; four hundred and thirty-five, or 11.66 per cent., were three-fourths verified; 2,869, or 76.90 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During March, 1883, one hundred and seventeen cautionary signals were displayed. Of these, one hundred and fifteen, or 98.3 per cent., were justified by winds of twenty-five miles per hour or more, at or within one hundred miles of the station. Thirty-two cautionary off-shore signals were displayed, twenty-seven of which, or 84.4 per cent., were justified, both as to direction and velocity; twenty-eight, or 87.5 per cent., were justified as to velocity, and thirty, or 93.8 per cent., were justified as to direction. Two "northwest" signals were displayed, both of which were justified. Forty-seven cautionary signals were changed to off-shore signals. One hundred and fifty-one signals of all kinds were displayed, and one hundred and forty-four, or 95.4 per cent, were fully justified. These do not include signals ordered at display stations, where the velocity of the wind is estimated only. Two signals were ordered late.

One hundred and thirty winds of twenty-five miles or more per hour were reported, for which signals were not ordered; many of these were high local winds or strong sea-breezes.

NAVIGATION.

STAGE OF WATER IN RIVERS.

The upper Mississippi river remained frozen during the month at St. Paul, Minnesota, and at La Crosse, Wisconsin, but at the latter station, observations were made by clearing the ice from the river-gauge, from the 1st to 5th, and from the 13th to 19th. At Davenport, Iowa, observations were made daily after the 18th. The highest stages at Keokuk, Iowa and Saint Louis, Missouri, were observed on the 1st. At stations below Cairo, Illinois, this subject is considered under the heading of Floods.

In the Missouri river, at Leavenworth, Kansas, the highest

stage occurred on the 27th, being nine feet, seven inches below the danger-line. At Omaha, Nebraska, the river was frozen from the 1st to 9th, after which observations were made daily, the highest stage being observed on the 25th. At Yankton, it was frozen from the 1st to 4th, and on the 11th, 12th and 13th.

The Ohio river was highest at Pittsburg, Pennsylvania, on the 1st and 31st, and at Cincinnati, Ohio, and Louisville, Kentucky, on the latter date.

At Pittsburg, on the 31st, a sudden rise of over eight feet occurred, sinking several coal barges and one steamer. The losses entailed are estimated at \$50,000.

The highest and lowest stages of water observed at the Signal-Service stations, during the month of January, 1883, are shown in the following table:

Heights of rivers above low-water mark, March, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
<i>Red River:</i>	<i>ft. in.</i>		<i>ft. in.</i>		<i>ft. in.</i>
Shreveport, La.	29 9	11, 12	23 3	30	19 7
<i>Arkansas:</i>					
Little Rock, Ark.	1	19 7	25, 29	2 10	
Fort Smith, Ark.	1	8 0	25	2 0	
<i>Missouri:</i>					
Yankton, Dak.	20 0	25	10 4	19	5 0
Omaha, Nebr.	16 0	25	10 1	10	5 0
Leavenworth, Kans.	21 0	27	11 5	2	5 8
<i>Mississippi:</i>					
Saint Paul, Minn.	14 6				
La Crosse, Wis.	18 0	15, 16, 17	3 8	1, 2	3 4
Dubuque, Iowa.	21 10	19	8 7	29, 30	5 0
Davenport, Iowa.	15 0	18	7 5	31	4 6
Keokuk, Iowa.	14 6	1	12 10	31	7 2
Saint Louis, Mo.	30 0	1	25 9	29	17 0
Cairo, Ill.	40 0	1	51 10	20	24 3
Memphis, Tenn.	31 0	510 8	35 8	30	19 2
Vicksburg, Miss.	41 0	31	43 5	1	42 3
New Orleans, La.	-2 6	31	-10 10	1	-2 11
Port Eads, La.		31	10 6	22	9 3
<i>Ohio:</i>					
Pittsburg, Pa.	20 0	31	14 6	29	4 3
Cincinnati, Ohio.	50 0	31	30 6	28	10 9
Louisville, Ky.	24 0	1, 31	11 8	18, 29	8 2
<i>Cumberland:</i>					
Nashville, Tenn.	42 0	31	18 10	22, 23	6 8
<i>Tennessee:</i>					
Knoxville, Tenn.		8	5 2	30	2 1
Chattanooga, Tenn.	31 0	10	9 10	24, 25	5 0
<i>Monongahela:</i>					
Pittsburg, Pa.	29 0	31	14 6	29	4 3
Morgantown, W. Va.	25 0	31	18 0	28	2 8
<i>Savannah:</i>					
Augusta, Ga.		27	13 0	18, 19	7 5
<i>Willamette:</i>					
Portland, Oreg.		30, 31	10 7	5	3 9
Umatilla, Oreg.		31	11 5	0	5 0
<i>Sacramento:</i>					
Red Bluff, Cal.		29	13 0	23, 24	1 4
Sacramento, Cal.		29	19 3	1	10 10
<i>Mobile:</i>					
Mobile, Ala.		25	17 4	26	15 4
<i>Colorado:</i>					
Yuma, Ariz.		29, 30	18 10	4, 5, 6	16 3

*Below bench-mark. †Below high water mark of 1874. ‡Frozen the entire month.
§Frozen part of month. See text.

FLOODS.

The floods in the lower Mississippi river which had not reached their greatest height at the close of February, although less destructive than the floods of 1882, have caused loss of life and great damage to property, the heaviest losses being along the western banks of the river in Arkansas.

At Cairo, Illinois, the river fell uninterruptedly during the month, falling below the danger-line on the 12th.

At Memphis, Tennessee, it rose until the 5th, and remained stationary until the 8th, being thirty-five feet eight inches above low-water, or one foot eight inches above the danger-line. After the 8th it fell steadily until the close of the month.

The river rose about one inch per day at Vicksburg, Mississippi, until the 11th, after which it remained nearly stationary until the 21st; it then fell slowly until the 28th, when it began to rise, reaching its highest stage on the 31st, the range for the month being one foot, two inches.

At New Orleans, Louisiana, it rose steadily during the month, at an average rate of less than one inch per day. On the 31st it was within ten inches of the high water-mark of

1874 and five inches below the highest of 1882, which occurred March 27th.

Although the water in the Ohio river had fallen below the danger-line, except at points in the vicinity of Cairo, Illinois, by the close of February, its disastrous effects will long be felt at the various towns on and adjacent to the river. Great destitution prevailed among many of the inhabitants of the flooded districts. Contributions amounting to more than \$50,000 were collected by the "New York Herald" and distributed to the sufferers at the various places along the river.

Concerning the floods during March in the Mississippi south of Cairo, the following information has been collected:—

At Helena, Arkansas, the river rose one and one-half inches during the 1st, at which time it was forty-three feet, eight inches above low-water mark, and six inches below high-water mark. The water in the White and Cache rivers was sufficiently high to cause great inconvenience to the inhabitants and the drowning of cattle. Breaks occurred in the vicinity of Vicksburg, but the damage to property was slight.

On the 2d, the water in the sunk lands and Saint Francis river continued to rise, the latter having risen fourteen inches during the preceding twenty-four hours.

The river continued to rise on the 3d, and from Helena to Memphis the water covered the country for miles on either side. From the Saint Francis river to the sunk lands, a large section of country was under water, except the Indian mounds and a few high ridges. Much stock was driven back to the hills, and the inhabitants abandoned the plantations in the lowlands.

On this date (3d) the water extended to Blackfish Bayou, twenty miles west of Memphis, sweeping away the telegraph-poles and causing interruption of communication and other damage between Memphis and Helena. In several places between Memphis and Blackfish, the track of the Little Rock railroad was badly washed. A rise of two inches occurred at Vicksburg on this date, causing breaks in the levees and flooding large sections of lowlands in Mississippi and Louisiana, and also several miles of the Shreveport and Pacific railroad in the latter state.

Reports received at New Orleans on the 5th, stated that a serious break had occurred in the Pastorio levee, inundating all the plantations outside of Lake Chicot, except those which were protected by private levees. During the night of this date the Totten levee, below Friar's Point, Mississippi, gave way, making a crevasse about two hundred yards wide, through which the water rushed with great force, flooding valuable plantations in that locality.

On the 7th, the water was from three to four feet higher than the lower parts of the city of Helena, and was rapidly rising. The levee about three miles below Friar's Point Mississippi, gave way and flooded that town. Other breaks also occurred at points below this place. The town of Austin, Mississippi, about seventy-five miles south of Memphis, was completely submerged. Large numbers of sawn logs were swept away in the Saint Francis river.

At places above Memphis, on the 8th, the river had declined from four to eight inches below the highest point attained. On plantations along the river below Memphis, people were confined to the upper stories of their houses, and rafts were constructed on which stock was placed. Skiffs and "dug-outs" were the only means of communication on the submerged farms. The first break on the east bank in the second levee district was reported at Memphis on this date (8th) by the officers of the steamer "Kate Adams." Below Helena the country was flooded to depths of from five to fifteen feet. The back-water from the Hubbard break appeared in the lower end of the city.

At Memphis, on the 9th, the river had fallen one inch during the twenty-four hours ending at 1.08 p. m., and at Helena it was about stationary. From Helena to Oldtown Ridge, eighteen miles below, the lands adjacent to the river were covered to as great, and in places to greater depths than during

the flood of 1882. Much stock was lost in this section, and great distress prevailed among the laboring classes. Some of the plantations as far out as Big Creek and White river bottoms were covered where there was no overflow in 1882. The trestle-work on the Iron Mountain and Southern railroad over Langville bottom was covered with four feet of water, and the track south of Helena was also submerged. In the Saint Francis river region the people resorted to the Indian mounds as the only places of safety. The town of Lake Village, Chicot county, Arkansas, was completely submerged by the breaking of the Panther Forest levee.

At Memphis, on the 11th, the river had fallen to thirty-five feet, three inches, or a total of seven inches during the four preceding days, and was one foot below high-water mark of 1882. At points above Memphis the river was within its banks and was declining at Helena and points below. To the south of Helena to the mouth of the White river, a distance of more than two hundred miles, and westward for a distance of thirty miles, the entire country was flooded. In this section large numbers of cattle and hogs were drowned, there being no means of rescuing them. All of the residents moved into higher localities. At Austin, Mississippi, the water flowed through the streets, invading all the dwellings and flooding the adjacent country.

On the 13th, the river at Helena had fallen about two inches during the preceding twenty-four hours. Great difficulty was experienced by the river steamers in delivering freight. At Friar's Point the wharf-boat was sunk and no freight could be delivered. At Westover, Arkansas, opposite Friar's Point, the water covered everything but a few of the highest points, on which live stock was gathered. A break occurred at Mason's in the Concordia and Australia sections in Mississippi. Seven miles of the Mobile and Northwestern railroad was swept out of position for a distance of one and one-half miles. On the Saint Francis river the floods have proved much more destructive than those of 1882. Wittsburg, the largest town on the river, was inundated to a greater extent than in 1882, and the damage is also much greater.

At Memphis, on the 13th, the river had fallen thirteen inches below the highest point reached, and the back-water which had covered the Little Rock and Memphis railroad was also declining. At Helena, the decline in the river was very slow, owing to the overflowed condition of the bottom-lands of the Saint Francis and White rivers.

On the 14th, the river at Helena had fallen one inch during the preceding night. On this date the Pacific and Southern Express Company resumed their regular trips over the Saint Louis, Iron Mountain, and Southern railroad. The breaks in the levee at Beasley's, in Laconia Circle, and Mason, Arkansas, occasioned great loss of property on both sides of the river. Over 30,000 acres of the richest land in that locality was flooded to depths of from three to six feet.

On the 15th, the river had fallen to two inches below the danger-line at Memphis, and was within its banks at points above. On this date the planters throughout this section began shipping mules to their plantations and making other preparations for farming operations. On the 16th, at 1 p. m., the river had fallen to thirty-three feet, and a general feeling of hopefulness prevailed. More than 1,000 men were employed in repairing the track of the Memphis and Little Rock railroad.

On the 17th, the river at Memphis had fallen to two feet, two inches below the danger-line, being a total decline of three feet, ten inches from the highest point attained. The situation at this time and place, as compared with that of 1882, shows a favorable contrast. The floods of this year will not interfere with the planting of crops in the Mississippi valley between Cairo and Vicksburg. In 1882 it was estimated that there were at least 20,000 persons rendered destitute in the Mississippi valley, and who were sustained for more than a month by the government. With the exception of stock drowned and of fences washed away, the damage sustained by the planters this

year has been nominal. In the counties along the western banks of the Mississippi in Arkansas the floods were more serious than those of 1882. In the vicinity of Oldtown, Arkansas, they were the most destructive ever experienced. In the Saint Francis river region large quantities of the cotton seed reserved for planting purposes were lost. This will occasion serious trouble to planters, as they had disposed of large quantities of seed to the oil-mills, reserving only a sufficient supply for seeding.

The heavy rains of the 20th and 21st caused damaging freshets in the Maritime Provinces of Canada, especially in Nova Scotia. The rivers and streams overflowed their banks, flooding the lowlands and sweeping away many bridges. The tracks of the various railroads were submerged and badly washed, causing delay of trains. In the Cornwallis river at Kentsville, Kings county, the freshet was reported to have been the severest known for many years. The floods in Cumberland county were also very destructive. Three bridges across the river Phillips were carried away. The Halifax and Cape Breton railway was seriously washed near Antigonishe. The town of Sherbrooke, Guysborough county, was flooded, and some houses were washed away. Great damage was also done to the bridges and mills along Wallace river and in other localities.

At New Ulm, Austin county, Texas, on the 24th, over six inches of rain fell in nine and one-half hours. The lowlands were overflowed and much damage done by washing up the newly planted corn.

On the 18th, at Chicago, Illinois, a heavy sea along the lake shore, caused damage to the extent of several thousand dollars. A large quantity of valuable timber on the government pier was washed off and carried into the lake. Several incomplete cribs were floated away and destroyed. It was with great difficulty that the steamer "Ludington" made this port.

HIGH TIDES.

New Haven, Connecticut, 10th; Block Island, Rhode Island, 10th; Flushing, New York, 10th; Eastport, Maine, 10th, 12th, 13th; Hatteras, North Carolina, 26th, very high, overflowing part of the island.

LOW TIDES.

Fort Macon, North Carolina, 13th; Flushing, New York, 14th.

ICE IN RIVERS AND HARBORS.

Passamaquoddy bay.—Eastport, Maine: floating ice in bay from 5th to 9th.

Hudson river.—Albany, New York: 10th, ice in river opposite city moved short distance. On the 29th, the steamer "Lotta" forced passage through the ice from this city to New Baltimore, being the first departure of the season. On the 29th, the ice moved out leaving the channel clear. 31st, navigation formally opened; the tug "Niagara" arrived, having in tow several canal-boats from New York.

Roundout, New York: on the 19th, all ice south of Poughkeepsie was moving and active preparations for the resumption of navigation were in progress. From Roundout to Hudson there were many open places, and along the shores the ice was broken and detached. The steamers on the lower Hudson made irregular trips during the previous week. The boats of the Havrestraw and Newberg line were in operation, and also those of the Homer Ramsdell line, of Newberg, and of the Poughkeepsie transportation company.

Troy, New York: on the afternoon of the 29th, the ice in the river opposite the city moved out without causing damage. At this time the river was open its entire length, but in places it was full of floating ice.

Niagara river.—Fort Niagara: during the night of the 14th-15th, the ice-bridge over the river broke up.

Broad lake.—Burlington, Vermont: lake frozen from 1st to 31st.

Lake Ontario.—Rochester, New York: on the morning of the 24th, a field of ice, about twenty miles in length, was observed

on the lake; 25th, the lake, as observed from this place, appeared to be covered with ice, and also on the 30th.

Sandusky bay.—Sandusky, Ohio: during the afternoon of the 14th, the ice in the bay began to move slowly, and on the 15th, the bay was entirely free of ice; but it again froze over on the 20th.

Delaware and Raritan canal.—Bordentown, New Jersey: 12th, canal navigation open; numerous arrivals on this date from Baltimore and Philadelphia, bound to New York.

Maumee river.—Toledo, Ohio: floating ice on the 1st, 3d, 5th; river frozen, 7th. On the 21st, the river was covered with ice from one to two inches thick. On the 27th, the river at Toledo was nearly free of ice, but at points below it was still frozen. On the 30th, the ice was disappearing rapidly.

Cuyahoga river.—Cleveland, Ohio: 8th and 9th, river was frozen during the morning but was opened by tugs; 14th, ice became detached from the shores and moved out. On the 21st, the river was again frozen; and was opened by tugs on the 24th.

Lake Erie.—Cleveland, Ohio: 19th, lake was filled with floating ice; on the 20th, it was frozen for a distance of one mile from the shore.

Detroit river.—Detroit, Michigan: drift-ice in river from 1st to 31st.

Lake Michigan.—Grand Haven: the steamer "Wisconsin" was fast in the ice, six miles north of the outer piers, from the 8th to 18th; on the latter date she was loosened from the ice-fields during a storm and arrived at Grand Haven in the afternoon. Captain McGregor reported that the ice was from twenty to thirty feet in thickness for a distance of from four to six miles, and that the ice-fields extended lakeward for a distance of from twenty to twenty-five miles. The "Wisconsin," although laden with nine hundred tons of freight, was lifted one foot above the water a few hours before being loosened from the ice. The steamer "Michigan" left harbor on the 18th for Milwaukee, and was caught in the ice about three miles off this port and is supposed to have drifted southward with the moving ice-fields.

Milwaukee, Wisconsin: Captain McIntyre, of the Goodrich transportation company, arrived during the morning of the 20th and reported that his boat was caught in the ice-fields for twelve days, six miles north of Grand Haven. The ice extended as far south as Holland, Michigan; it was from fifteen to eighteen miles wide and thirty feet in depth.

Lake Huron and Saint Clair river.—Port Huron, Michigan: the ice-bridge at Fort Gratiot light-house and the ice-dam opposite the lower end of the city broke during the morning of the 2d. There was heavy floating ice in the river on the 5th, 11th, 15th, and 28th. On the night of the 19th–20th, a second ice-bridge formed near Fort Gratiot light-house at the base of Lake Huron. On the 27th, solid ice extended out into the lake as far as the eye could reach, and also on the 31st.

Little Bay de Noquet.—Escanaba, Michigan: bay frozen from 1st to 31st.

Lake Superior.—Duluth, Minnesota: all ice moved out on the 24th; lake frozen as far as the eye could reach on the 28th.

Mississippi river.—Saint Paul, Minnesota: river frozen from 1st to 31st.

La Crosse, Wisconsin: river frozen from 1st to 31st; teams crossed on the ice up to 13th.

Dubuque, Iowa: on the 2d, the ice was about fifteen inches thick, and afforded safe transit for teams. At 10 a. m. of the 8th, the ice broke below the railroad-bridge, but teams continued to cross opposite the levee. The ice melted rapidly on the 14th, and on the 16th, an ice-dam formed on the islands below the city. On the 24th, the ice-dam above the bridge gave way. The river was free from ice except along the shore on the 28th, and on the 29th, the steamer "Keokuk" arrived from Saint Louis, being twenty-seven days later than the first arrival of 1882. Floating ice continued on the 29th, 30th, 31st.

Davenport, Iowa: the ice moved slightly on the rapids during the afternoon of the 2d; and on the 9th, the ice above the

bridge moved about one-half mile. On the 13th and 14th, an ice-dam formed at the islands below the city. The ice-dam broke on the 17th; and floating ice continued until the 21st. The steamer "J. W. Mills," (the first boat of season) arrived on the 27th.

Burlington, Iowa: the ice began to move on the 1st, and continued during the 2d. The first boat of the season arrived on the 15th.

Keokuk, Iowa: the ice broke up during the afternoon of the 1st. The steamer "Keokuk" from Saint Louis arrived on the 5th, being the first boat of the season.

Maquoketa river.—Monticello, Iowa: the ice moved out of the river on the 18th; it had been closed since December 6th, 1882—one hundred and two days. The ferry-boat began running on the 19th.

Des Moines river.—Des Moines, Iowa: the ice broke in the river on the 12th, and by the 22d the river was clear of ice.

Humboldt, Iowa: on the 12th, the ice broke up in the river between this place and Fort Dodge, a distance of twenty miles. On the 17th, the river was free from ice.

Republican river.—Clay Centre, Kansas: the ice moved out of river on the 1st.

Missouri river.—Fort Benton, Montana: the ice in the river at this place broke up at 10 a. m. of the 5th.

Fort Bennett, Dakota: ice broke up during the afternoon of the 17th.

Fort Hale, Dakota: river opened at this place on the 17th.

Fort Randall, Dakota: ice broke during the afternoon of the 21st.

Yankton, Dakota: the ice began to move at 4.50 p. m. of the 4th, but remained solid until the afternoon of the 13th, when it broke up. Ferry-boats first crossed the river on the 21st.

Omaha, Nebraska: river opened on the 9th.

Leavenworth, Kansas: floating ice from 1st to 8th, 12th, 22d, 27th to 31st.

Yellowstone river.—Billings, Montana: ice broke up during the afternoon of the 17th.

Terry's Landing, Montana: river opened on 13th.

Fort Keogh, Montana: river opened on 12th.

Glendive, Montana: the ice broke up and moved out without damage at 3 p. m. of the 17th.

Tongue river.—Fort Keogh, Montana: river opened on 2d.

Miscellaneous.—Reports from Saint John, New Brunswick, on the 21st, stated that Mines Basin, Nova Scotia, was blocked with immense ice-fields extending from shore to shore. In the centre of the basin the ice had formed into lumps of more than ten feet in thickness and weighing many tons.

Dyberry, Pennsylvania: on the 5th, the ice on ponds in this vicinity was twenty-five inches thick.

Catawissa, Pennsylvania: navigation on the North Branch canal opened on the 31st.

WATER-SPOUTS.

The Chief Signal Officer has received from Captain A. W. Jeffery, of the s. s. "Ptolemy," an interesting letter, together with an illustration concerning a water-spout which was observed at 7 a. m. of February 10, 1883, in latitude S. 7°, longitude W. 34°.

The water-spout traveled in a westerly direction at about the rate of twenty miles per hour. The edges of the column were well-defined and seemed semi-transparent. The spiral column was a modified form of the nimbus cloud, and the well-defined edges seemed nothing but rain. As the rain became exhausted from the cloud, the column gradually diminished and finally ascended into the cloud.

Captain Jeffery states that, in his opinion, the danger from water-spouts does not arise from the deluge of water, but from the strength of the whirlwind against the canvas of the vessel.

TEMPERATURE OF WATER.

The temperature of water as observed in rivers and harbors

at the Signal-Service stations, with the average depth at which the observations were made, are given in the table below, with monthly ranges of water-temperatures and the mean temperature of the air at the various stations. Observations were interrupted by ice at the following stations: Sandusky, Ohio, from the 1st to 14th, and from the 20th to 31st; Cleveland, Ohio, from 1st to 16th, and from 19th to 31st; Duluth, Minnesota, from 1st to 23d, and 28th to 31.

The largest monthly ranges of water-temperature are: Galveston, Texas, 15°; Indianola, Texas, 13°·7; Key West, Florida, 11°·6; Cedar Keys, Florida, 11°; Sandy Hook, New Jersey, 10°·6. The smallest are: Eastport, Maine, 1°·6; Wilmington, North Carolina, 3°; Portland, Oregon, 3°·5; San Francisco, California, 3°·8; Baltimore, Maryland, 4°; New London, Connecticut, 4°.

Temperature of Water for March, 1883.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey	40.0	34.5	5.5	6 0	35.0
Alpena, Michigan*	60.0	50.5	9.5	9 0	53.8
Augusta, Georgia	42.7	38.0	4.7	9 5	39.4
Baltimore, Maryland	39.7	30.3	9.4	8 7	32.6
Block Island, Rhode Island	34.0	28.0	6.0	25 0	31.3
Boston, Massachusetts	71.0	60.0	11.0	10 2	61.3
Buffalo, New York*	58.5	53.4	5.1	39 10	53.8
Cedar Keys, Florida	47.5	38.0	9.5	5 8	38.7
Charleston, South Carolina	34.3	34.2	0.1	14 0	28.4
Chicago, Illinois	41.3	36.1	5.2	6 2	37.0
Chincoteague, Virginia	35.2	33.6	1.6	15 8	22.6
Cleveland, Ohio†	32.2	30.6	1.6	16 9	23.6
Detroit, Michigan*	61.0	46.0	15.0	14 8	62.4
Delaware Breakwater, Delaware	36.6	29.0	7.6	19 0	27.3
Duluth, Minnesota†	71.5	57.8	13.7	9 1	64.0
Eastport, Maine	66.0	60.0	6.0	18 0	60.4
Escanaba, Michigan*	81.4	69.8	11.6	16 9	72.7
Galveston, Texas	63.5	55.0	8.5	16 3	57.7
Grand Haven, Michigan	38.6	30.6	8.0	14 3	29.9
Indianola, Texas	38.0	34.0	4.0	12 8	32.2
Jacksonville, Florida	38.5	31.7	6.8	10 5	32.0
Key West, Florida	37.7	31.7	6.0	16 5	33.6
Mackinaw City, Michigan*	51.0	42.0	9.0	17 2	44.8
Marquette, Michigan*	66.8	56.9	9.9	17 9	58.0
Milwaukee, Wisconsin*	34.5	31.0	3.5	18 0	28.9
Mobile, Alabama	48.0	40.3	7.7	47 4	50.4
New Haven, Connecticut	55.0	45.7	9.3	9 11	60.8
New London, Connecticut	36.0	30.5	5.5	14 0	30.1
Newport, Rhode Island	75.0	66.6	8.4	11 3	67.1
New York City	32.6	31.6	1.0	10 0	31.2
Norfolk, Virginia	42.8	32.2	10.6	1 4	34.4
Pensacola, Florida	54.6	50.8	3.8	29 5	53.0
Port Eads, Louisiana	59.0	53.0	6.0	13 7	57.1
Provincetown, Massachusetts	58.0	49.0	9.0	10 0	48.8
Punta Rassa, Florida	53.0	50.0	3.0	13 0	50.8
Sandusky, Ohio					
Sandy Hook, New Jersey					
San Francisco, California					
Savannah, Georgia					
Smithville, North Carolina					
Toledo, Ohio*					
Wilmington, North Carolina					

* Frozen throughout month. † Observations incomplete. See text.

ATMOSPHERIC ELECTRICITY.

AURORAS.

On the evening of March 1st an auroral display was observed at stations in New England, and from the upper lake region westward to Montana; the most southerly stations reporting the display being in Nebraska and Iowa. This display, although extensively observed, was not brilliant.

On the 2d, a display was reported from stations in the upper lake region, extreme northwest, and the upper Mississippi valley. At Burlington, Vermont, it was observed in the form of a bright yellow light, with a few streamers, from 9 to 11 p. m., and continued until 12.20 a. m. of the 3d. It extended from 15° east to 25° west of north and to an altitude of 25°. At 11.25 p. m. streamers of a variety of colors rose to an altitude of 45°. At Saint Vincent, Minnesota, the display was faint and continued from 8 p. m. until the morning of the 3d. It appeared in the form of two arches separated by a space of about 5°. The most southerly station reporting this display was Monticello, Iowa.

On the 3d, a faint display was generally observed in New

England, the upper lake region and upper Mississippi valley, and was also reported to have been seen at Barnegat City, New Jersey; Emmittsburg, Maryland, and Red Willow, Nebraska. Other displays were observed as follows:—On the 4th, at stations in the upper lake region and in New England; 6th, in the upper lake region, upper Mississippi valley and extreme northwest; 7th, from New England westward to the extreme northwest; 8th, from New England westward to Dakota—this display was also observed at San Francisco, California; 9th, in New England and the lower lakes; 12th, in the upper lake region and upper Mississippi valley, Montana, Wyoming and Washington Territory; 13th, in New England, northern Illinois, Iowa and eastern Nebraska; 15th, at Clay Centre, Kansas, Franklin, Wisconsin, and Clear Creek, Nebraska; 17th, Clear Creek, Nebraska; 18th, at Wellsboro, Pennsylvania; 19th, Cedar Rapids, Iowa; 21st, Bordentown, New Jersey, and Fort Brady, Michigan; from the 25th to 31st, auroras of more or less brilliancy were of nightly occurrence; on the 31st, a bright display was observed at Kiantone, New York. On the 18th, at Denison, Texas, an auroral light was reported to have been seen through the broken clouds from 7.15 to 8.30 p. m.

At Mobile, Alabama, on the 22d, between 10.30 and 11.20 p. m., there were observed in the northern sky, three luminous beams of pale yellow light. These bands had a gradual lateral motion from east to west, cutting the magnetic meridian at nearly right angles. At the same time a single luminous band was observed in the southwestern sky.

Captain J. T. Hein, of the s. s. "Hermes," reported: On the 9th, at 8 p. m., in about N. 45°, W. 42°, observed a brilliant northern light, lasting until 11 p. m. The air was filled with electricity during that time, and every point and wire-rope—even the edges of the smoke-stack—were illuminated by it.

ATMOSPHERIC ELECTRICITY INTERRUPTING TELEGRAPHIC COMMUNICATION.

Fort Supply, Indian Territory, 15th.

Coleman City, Texas, 23d.

Prescott, Arizona, 10th.

THUNDER-STORMS.

Thunder-storms were reported in the various states and territories, as follows:—

Alabama.—Auburn, 19th; Montgomery, 19th, 24th, 25th; Mobile, 24th.

Arizona.—Yuma, 1st, 2d, 12th, 15th, 17th; Prescott, 7th, 10th, 13th to 16th, 29th; Tucson, 9th, 23d; Apache Pass, 11th; Fort Apache, 16th, 29th, 30th.

Arkansas.—Fort Smith, 15th, 18th, 30th; Mount Ida, 23d, 29th; Little Rock, 30th.

California.—San Diego, 1st; Poway, 1st, 3d, 5th, 6th; Princeton, 12th; Fort Yuma, 15th; Sacramento, 27th; San Francisco, 28th; Visalia, 27th 28th.

Colorado.—Fort Collins, 28th, 30th; Denver, 29th.

Connecticut.—Bethel, 19th, 20th; New Haven, 20th; Southington, 20th.

Delaware.—Delaware Breakwater, 19th.

Florida.—Punta Rassa, 8th, 11th, 20th, 25th; Pensacola, 8th, 24th, 25th; Cedar Keys, 19th, 25th; Key West, 20th, 25th, 30th; Jacksonville, 31st; Sanford, 31st.

Georgia.—Forsyth, 15th, 19th, 20th, 31st; Augusta, 19th, 30th, 31st; Atlanta, 19th, 30th; Savannah, 19th.

Idaho.—Lewiston, 28th, 30th; Fort Lapwai, 28th.

Illinois.—They were reported by numerous stations throughout the state on the 13th, 14th, 28th, 29th, 30th, and at Anna, 6th; Swanwick, 6th; Cairo, 15th, 31st.

Indiana.—Lafayette, 5th; New Harmony, 6th; Logansport, 12th; Laconia, 30th; and of general occurrence throughout the state on the 14th.

Indian Territory.—Fort Supply, 15th, 23d.

Iowa.—Keokuk, 13th; Monticello, 13th.

Kansas.—Of general occurrence on the 5th and 4th; Fort Scott, 6th; Topeka, 13th; Independence, 18th.

Kentucky.—Bowling Green, 24th, 29th, 30th; Louisville, 29th, 30th.

Louisiana.—Point Pleasant, 19th, 24th, 25th, 30th, 31st; Port Eads, 13th, 19th, 24th; Shreveport, 19th, 24th, 30th; New Orleans, 24th.

Michigan.—Ottisville, 14th; Port Huron, 14th; Lansing, 15th; Alpena, 25th.

Mississippi.—Vicksburg, 25th, 31st; Starkville, 31st.

Missouri.—Archie, 5th; Protom, 6th, 18th; Springfield, 6th; Saint Louis, 13th, 29th.

Nevada.—Pioche, 23d.

New Jersey.—Sandy Hook, 19th; Manasquan, 20th.

New Mexico.—Fort Cummings, 9th; Fort Bayard, 9th; Santa Fé, 11th, 15th, 24th; Fort Union, 12th.

North Carolina.—Of general occurrence in the state on the 19th, 30th, 31st; and were also reported from Life-saving Station No. 6, on the 15th, 16th, 28th; Brevard, 3d; Hatteras, 6th, 15th, 18th, 20th, 26th; Kittyhawk, 15th; Smithville, 20th.

Ohio.—Of general occurrence on the 14th; and at Bethal, 9th; Sandusky, 15th; Cincinnati, 30th.

Oregon.—Albany, 23d.

Pennsylvania.—Williamsport, 15th.

South Carolina.—Stateburg, 19th, 20th, 30th; Charleston, 30th.

Tennessee.—Memphis, 29th, 30th, 31st; Nashville, 29th, 30th, 31st; Chattanooga, 30th, 31st; Murfreesborough, 31st; Knoxville, 31st.

Texas.—They were of general occurrence along the Gulf coast on 13th and 15th; and in northern Texas on 18th, 23d, 24th; and reported Fort McKavett, 16th; Denison, 18th; Fort Elliott, 18th; Palestine, 18th, 19th, 24th, 30th, 31st; Galveston, 19th, 24th.

Utah.—Nephi, 24th.

Virginia.—Chincoteague, 19th; Norfolk, 30th; Wytheville, 30th; Cape Henry, 31st.

Washington.—Spokane Falls, 24th.

West Virginia.—Helvetia, 30th.

Wyoming.—Cheyenne, 29th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts, on the following dates:—

New England.—1st, 3d, 6th, 8th, 14th, 15th, 17th, 20th, 21st, 24th, 26th, 29th, 30th, 31st.

Middle Atlantic states.—6th, 7th, 8th, 13th, 17th, 21st, 22d, 24th to 27th, 30th, 31st.

South Atlantic states.—6th, 19th, 14th, 15th, 17th, 21st, 24th, 25th, 27th, 29th, 30th.

Eastern Gulf.—6th, 10th, 11th, 14th, 16th, 21st, 23d, 27th, 29th, 30th, 31st.

Western Gulf.—3d, 4th, 9th, 11th, 20th, 22d, 23d, 24th, 29th.

Ohio valley and Tennessee.—2d, 4th, 5th, 7th, 16th, 17th, 20th, 24th, 25th, 27th, 28th.

Lower lakes.—5th, 6th, 8th, 12th, 15th, 20th, 23d to 27th, 30th, 31st.

Upper lakes.—2d, 3d, 5th, 7th, 9th, 10th, 12th, 13th, 16th, 17th, 20th, 24th, 25th, 26th, 29th, 30th, 31st.

Extreme northwest.—3d, 13th, 18th, 19th, 20th, 29th, 30th, 31st.

Upper Mississippi valley.—4th, 5th, 7th, 8th, 9th, 12th, 15th, 16th, 20th, 21st, 22d, 24th, 26th, 28th, 29th.

Missouri valley.—1st to 4th, 7th, 9th, 12th, 13th, 15th, 19th, 23d, 24th.

California.—4th, 6th, 9th to 12th, 24th, 25th, 26th.

Solar halos were also observed in the following states and territories not included in the districts named above:

Arizona.—Prescott, 21st, 25th, 29th.

Idaho.—Lewiston, 1st, 7th, 22d, 25th, 31st.

Kansas.—Clay Centre, 19th; Elk Falls, 12th; Yates Centre, 2d, 6th, 7th, 19th, 20th.

Nevada.—Carson City, 22d.

New Mexico.—Santa Fé, 11th.

Oregon.—Roseburg, 10th.

Texas.—Eagle Pass, 30th.

Utah.—Salt Lake City, 3d.

Washington.—Colfax, 23d.

Lansing, Michigan, 2d: at 4 p. m., a solar halo of 22° radius was observed, with two bright parhelia, one above and the other on the left of the sun. There was an arc of a fainter halo of 45° radius on the left of sun. The clouds were cirro-stratus and cirro-cumulus, of bluish gray.

Mr. B. B. Cutter, of Heath, Massachusetts, reports that a remarkable solar halo was observed at that place at 9.30 a. m., of the 26th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England.—1st, 14th, 16th, 17th, 19th to 24th.

Middle Atlantic states.—2d, 16th to 26th.

South Atlantic states.—19th, 20th, 24th, 25th.

Eastern Gulf.—13th, 16th, 19th, 23d, 29th.

Western Gulf.—13th to 16th, 20th, 22d, 24th, 25th, 26th.

Ohio valley and Tennessee.—13th, 15th, 16th, 17th, 19th, 22d, 24th, 25th.

Lower lakes.—12th to 17th, 22d, 24th, 25th, 26th, 29th.

Upper lakes.—13th, 14th, 16th, 17th, 19th, 20th, 23d, 24th, 29th.

Extreme northwest.—15th, 16th, 20th, 23d, 24th.

Upper Mississippi valley.—2d, 13th, 14th, 16th to 19th, 21st.

Missouri valley.—7th, 8th, 12th, 13th, 15th, 16th, 18th, 19th, 20th, 23d.

Northern slope.—13th, 14th, 16th, 19th, 21st, 22d.

Southern slope.—1st, 14th, 21st, 22d.

Southern plateau.—2d, 11th, 13th, 14th, 15th, 21st, 26th to 30th.

Middle plateau.—1st, 19th, 21st, 23d, 24th.

Lunar halos were also observed in the following states and territories not included in the districts named above:

California.—Los Angeles, 12th; Visalia, 3d, 19th, 22d, 24th.

Florida.—Cedar Keys, 16th, 18th.

Kansas.—Salina, 18th, 19th; Yates Centre, 19th, 20th, 23d.

Nevada.—Carson City, 21st, 22d; Pioche, 31st.

Oregon.—Portland, 18th.

Texas.—Eagle Pass, 1st.

Utah.—Nephi, 21st; Salt Lake City, 21st, 22d.

Washington.—Bainbridge Island, 13th, 18th, 19th, 21st.

MIRAGE.

Alexandria, Dakota, 11th, 19th.

Pretty Prairie, Kansas, 1st.

Indianola, Texas, 8th, 9th, 16th, 17th, 20th, 21st, 24th, 26th.

MISCELLANEOUS PHENOMENA.

SUN SPOTS.

The following record of sun spots for the month of March, 1883, has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:—

DATE— Mar., 1883.	No. of new		Disappear'd by solar rotation.		Reappear'd by solar rotation.		Total No. visible.		REMARKS.
Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots		
1, 4 p. m.	0	0	0	0	0	0	0	6	
2, 9 a. m.	0	0	0	0	0	0	0	5	
3, 9 a. m.	0	0	0	0	0	0	0	3	
4, 4 p. m.	4	10						10	
5, 11 a. m.								12	
6, 11 a. m.	0	5	0	0	0	2	4	17	
7, 11 a. m.	0	5	0	2	0	3	4	20	
8, 12 m.	0	3	1	2	0	0	3	20	
9, 3 p. m.	0	0	0	0	0	0	3	20	
10, 10 a. m.	0	0	1	5	0	0	2	15	
11, 9 a. m.	0	5	0	2	0	0	2	20	
12, 9 a. m.	1	7	1	2	0	0	2	25	
13, 11 a. m.	0	5	0	0	0	0	2	30	
14, 10 a. m.	0	0	0	0	0	0	2	30	
15, 12 m.	0	0	0	0	0	0	2	25	
16, 10 a. m.	1	5	0	0	1	5	3	30	
17, 7 a. m.	0	5	0	0	0	0	3	25	

†Approximated. Faculae were seen at the time of every observation.

Mr. H. D. Govey, at North Lewisburg, Ohio, reports that sun spots were observed on all clear days during the month. They were most numerous on the 13th; least numerous on the 1st; largest on 30th; and smallest on the 3d.

Mr. Howard Shriver, of Wytheville, Virginia, reports sun spots as follows:—1st, one spot; 17th, two spots of medium size; 18th, three large spots and numerous small ones; 20th, two large spots and numerous small ones; 24th, one large spot and numerous small ones; 30th, one large spot and two small or medium ones.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal-Service stations. Reports from one hundred and eighty-three stations show 5,630 observations to have been made, of which fifteen were reported doubtful; of the remainder, 5,615, there were 4,783, or 85.1 per cent., followed by the expected weather.

METEORS.

West Washington, District of Columbia, 1st.—A bright meteor was observed at an altitude of 30° , in the northwestern sky, passing in a southwesterly direction.

Woodstock, Vermont, 1st.—A large and brilliant meteor was reported to have been observed at Hartford, five miles east of the place, at 4.30 a. m. It resembled a ball of fire, falling rapidly, and disappeared when a short distance above the horizon.

Hector, New York, 1st.—At 8 p. m., a bright meteor was observed in the northwestern sky, at an altitude of about 40° ; it moved downward a short distance and disappeared.

Petersburg, Virginia, 4th.—A very brilliant meteor was observed during the early morning. It resembled a large ball of fire, and during its flight illuminated the city so that a newspaper might have been read by its light. Its course was northward; an explosion was heard shortly afterwards.

Springfield, Missouri, 11th.—A brilliant meteor was observed at 7.12 p. m., moving in a southwesterly direction at an elevation of 10° , and exploded before disappearing.

Indianapolis, Indiana, 12th.—A very large meteor was observed at 7.30 p. m., passing southwestward from a point about 25° above the horizon in the northern sky. A feeble noise was distinctly audible during its passage. After disappearing, a cloud-like tail remained visible for several seconds.

Otisville, Michigan, 15th.—At 8.05 p. m., a brilliant meteor was observed to start from a point about 20° east of the zenith; it moved southwestward and disappeared when at about 30° above the horizon.

Corning, Missouri, 16th.—At 8.35 p. m., a very large meteor was observed, apparently of about three times the size of Jupiter.

Meteors of less brilliancy were reported by the following stations:—

Yuma, Arizona, 8th, 9th.
 Visalia, California, 14th, 18th.
 Lansing, Michigan, 15th.
 Woodstock, Maryland, 2d, 4th, 8th, 10th.
 Crete, Nebraska, 3d.
 Fremont, Nebraska, 12th.
 Variety Mills, Virginia, 4th, 8th.
 Wytheville, Virginia, 3d.
 Pioche, Nevada, 6th.

EARTHQUAKES.

Fallstown, Maryland, 11th.—At 6.57 p. m. a rumbling sound of a second's duration, attended by a trembling of the earth, disturbed the residents of this (Hartford) county and also in the adjacent parts of Baltimore county. The disturbance seems to have been noticed only by those in-doors. The shock appeared to come from the south, and was sufficiently severe to stop clocks and to rattle windows, crockery, etc. A second shock was reported to have occurred between midnight and 1 a. m. of the 12th.

Waterloo, Quebec, 11th.—Between 10 and 11 a. m. two distinct shocks of earthquake were felt, the wave passing from east to west. These shocks were also reported to have been felt at Saint John's and Cowansville, Quebec.

San Francisco, California, 30th.—Light shocks of earthquake were felt in this city and vicinity at 7.48, 7.52, and 8.15 a. m.; the first being the heaviest. At points farther south the shocks were more numerous and severe. At Watsonville, Santa Cruz county, nine shocks were felt breaking crockery, plastering, etc. At Hollister, San Benito county, plate-glass windows were broken and the walls of brick-buildings cracked.

SAND-STORMS.

Yuma, Arizona, 22d, 29th.
 Fort Thomas, Arizona, 2d, 11th.
 Table Rock, Nebraska, 18th.
 Salinas, Kansas, 18th, 20th, 22d.

POLAR BANDS.

Cape Mendocino, California, 1st.
 Sacramento, California, 29th.
 Alexandria, Dakota, 1st.
 Riley, Illinois, 5th.
 Yates Centre, Kansas, 3d, 19th.
 Gardiner, Maine, 9th, 12th, 14th.
 Lansing, Michigan, 3d.
 Thornville, Michigan, 20th.
 Protom, Missouri, 8th, 9th, 11th, 12th, 18th, 19th, 23d.
 Clear Creek, Nebraska, 16th.
 Bordentown, New Jersey, 15th, 20th, 21st, 22d.
 Freehold, New Jersey, 9th, 17th, 22d.
 Vineland, New Jersey, 8th, 9th, 16th.
 Menand Station (near Albany), New York, 12th.
 Ore Knob, North Carolina, 7th.
 Catawissa, Pennsylvania, 5th.
 Memphis, Tennessee, 23d.
 Nashville, Tennessee, 4th, 15th, 16th.
 Palestine, Texas, 22d.
 Marion, Virginia, 17th.
 Wytheville, Virginia, 9th.

ZODIACAL LIGHT.

Arizona.—Prescott, 1st, 5th to 10th, 25th, 26th, 27th, 31st.
 Connecticut.—New Haven, 1st, 2d, 3d, 5th, 9th.
 Florida.—Punta Rassa, 6th.
 Illinois.—2d, 3d, 7th, 8th.
 Iowa.—Cresco, 1st, 3d, 8th, 10th, 28th; Monticello, 1st, 3d, 5th.
 Kansas.—Elk Falls, 12th; Lawrence, 7th, 8th; Salina, 2d; Yates Centre, 1st, 11th.
 Maine.—Cornish, 5th, 8th, 9th, 30th; Orono, 8th.
 Massachusetts.—Cambridge, 1st, 2d, 4th, 5th, 7th, 8th, 9th, 25th, 28th, 29th, 30th; Fall river, 22d, 24th, 25th; Somerset, 1st, 2d, 5th, 7th to 10th, 25th, 28th; Williamstown, 9th.
 Minnesota.—Northfield, 2d, 3d, 6th, 10th.
 Nebraska.—Clear Creek, 5th to 10th, 14th, 15th.
 New Jersey.—Moorestown, 8th.
 Oregon.—Albany, 5th, 6th.
 Pennsylvania.—Dyberry, 5th; Fallsington, 7th; State College, 1st, 2d, 4th.
 Rhode Island.—Point Judith, 25th, 28th.
 Tennessee.—Chattanooga, 8th; Nashville, 2d, 3d, 8th, 9th, 27th, 28th, 29th.
 Texas.—Fort McKavett, 9th; Palestine, 20th, 21st, 26th.
 Virginia.—Variety Mills, 1st to 4th, 7th, 8th, 10th, 27th; Wytheville, 1st, 3d, 4th, 7th, 8th.
 Wisconsin.—Franklin, 4th, 6th to 9th.

PRAIRIE AND FOREST FIRES.

Arkansas City, Arkansas, 18th.—On a sheep farm, fifteen miles from this place, about 1,400 sheep were killed by prairie fires.
 Allentown, Pennsylvania, 29th.—On this date a fire is raging

on Blue mountains, near the Lehigh gap, destroying much valuable timber.

Less extensive fires were reported, as follows:—

Alexandria, Dakota, 12th, 17th, 24th.

Fort Meade, Dakota, 13th, 14th, 17th.

Fort Yates, Dakota, 8th.

Yankton, Dakota, 7th, 8th, 10th, 12th to 15th, 19th, 24th, 25th.

Humboldt, Iowa, 17th, 24th, 29th, 30th, 31st.

Creswell, Kansas, 6th, 10th, 11th, 18th, 19th, 22d.

Fort Riley, Kansas, 19th, 20th.

Clay Centre, Kansas, 1st.

Independence, Kansas, 1st, 2d, 3d to 23d, 26th, 27th, 30th.

Yates Centre, Kansas, 9th to 12th.

Crete, Nebraska, 8th, 10th, 13th.

North Platte, Nebraska, 24th.

Omaha, Nebraska, 17th.

Portland, Oregon, 21st.

Chattanooga, Tennessee, 1st, 4th, 5th.

Coleman City, Texas, 2d, 6th, 7th, 11th.

Indianola, Texas, 3d.

Wytheville, Virginia, mountain fires, 1st.

DROUGHT.

Cape Mendocino, California, 13th.—Along the coast, north and south of this place, the prevalent fogs have prevented the grass from drying up, but further inland the fields are scorched and rain is greatly needed. 18th.—Great alarm is felt among farmers concerning the probable failure of crops, owing to the prolonged drought. Notwithstanding the dews and heavy fogs its effects are felt in this vicinity.

Visalia, California, 31st.—The recent rains have proved of great benefit to agricultural interests. Vegetation has made rapid progress during the past few days, and the prospects are favorable for a good crop.

Bangor, Maine, 31st.—The mills in this locality are shut down on account of low water.

MIGRATION OF BIRDS.

Geese flying northward.—Point Judith, Rhode Island, 13th, 14th, 15th, 17th, 18th, 20th; Portland, Maine, 31st; Augusta, Georgia, 1st, 5th; Palestine, Texas, 2d, 4th, 5th, 11th, 17th; Denison, Texas, 11th, 20th; Logansport, Indiana, 8th, 16th, 17th; Oswego, New York, 26th, 27th; Toledo, Ohio, 15th; Buffalo, New York, 30th; Champaign, Illinois, 20th, 23d, 26th, 30th; Keokuk, Iowa, 4th; Omaha, Nebraska, 2d, 5th; Yuma, Arizona, 22d, 23d; Lewiston, Idaho, 28th; Spangle, Washington Territory, 6th, 9th, 11th; Portland, Oregon, 2d; Bethel, Connecticut, 19th; Morriston, Dakota, 22d; Alexandria, Dakota, 4th, 13th; Forsyth, Georgia, 19th; Elmira, Illinois, 1st; Riley, Illinois, 13th; Swanwick, Illinois, 4th; Edgington, Illinois, 1st, 2d, 9th, 12th, 18th, 21st; Monticello, Iowa, 17th; Des Moines, Iowa, 25th; Creswell, Kansas, 13th, 17th; Holton, Kansas, 5th; Independence, Kansas, 3d, 13th, 24th; Yates Centre, Kansas, 23d; Pretty Prairie, Kansas, 1st, 6th, 13th; Osawatomie, Kansas, 14th; Somerset, Massachusetts, 28th; Clear Creek, Nebraska, 1st, 5th, 22d; Crete, Nebraska, 1st; Flushing, New York, 18th; Jacksonburg, Ohio, 17th; Canal Dover, Ohio, 19th, 21st, 26th, Grampian Hills, Pennsylvania, 14th; Variety Mills, Virginia, 1st, 3d; Cedar Rapids, Iowa, 16th. *Flying southward.*—Augusta, Georgia, 3d; Toledo, Ohio, 5th; Cleveland, Ohio, 2d; Des Moines, Iowa, 6th; Riley, Illinois, 29th; Edgington, Illinois, 14th; Humboldt, Iowa, 18th; Creswell, Kansas, 8th, 13th; Clay Centre, Kansas, 12th; Wytheville, Virginia, 1st. *Flying eastward.*—Umatilla, Oregon, 29th; Edgington, Illinois, 21st.

Ducks flying northward.—Point Judith, Rhode Island, 20th; Logansport, Indiana, 8th; Toledo, Ohio, 27th; Huron, Dakota, 15th; Alexandria, Dakota, 13th; Edgington, Illinois, 2d, 9th, 12th, 18th; Monticello, Iowa, 17th; Humboldt, Iowa, 13th; Des Moines, Iowa, 25th; Yates Centre, Kansas, 21st, 24th; Fort Scott, Kansas, 1st; Clear Creek, Nebraska, 5th, 22d;

Jacksonburg, Ohio, 30th. *Flying southward.*—Hatteras, North Carolina, 26th; Edgington, Illinois, 24th; Crete, Nebraska, appearing, 30th; Guttenburg, Iowa, appearing, 14th.

Cranes flying northward.—Visalia, California, 26th; Humboldt, Iowa, 24th; Clear Creek, Nebraska, Brants flying northward, 3d.

NOTES AND EXTRACTS.

The following summary is taken from the "March Report of the Tennessee Weather Service," under direction of Mr. A. J. McWhirter, Commissioner of Agriculture, Statistics and Mines.

Station.	County.	Name of observer.	Mean temperature.	Maximum temperature.	Minimum temperature.	Rainfall.
Flat Creek.....	Bedford.....	Wm. Hart.....	45.2	71	23	4.42
Maryville.....	Blount.....	W. H. Henry.....				4.41
Grief.....	Bradley.....	J. T. Cowden.....				4.53
Caryville.....	Campbell.....	Fletcher Smith.....				5.30
Huntingdon.....	Carroll.....	J. S. Ramsey, M. D.....	45	71	30	3.01
McKenzie.....	Carroll.....	John Brown.....	46	75	12	2.80
Kingston Springs.....	Cheatham.....	W. J. Inman.....				3.22
Beech Grove.....	Coffee.....	B. F. Cheatham.....	47.2	72	24	4.49
Grassy Cove.....	Cumberland.....	Nettie M. Stratton.....	41.3	74	17	2.06
Gadsden.....	Crockett.....	W. T. Moore.....				1.40
Smithville.....	De Kalb.....	E. C. Blumh.....	47	70	20	2.70
White Bluff.....	Dickson.....	T. C. Reynolds.....				1.40
Milan.....	Gibson.....	M. D. L. Jordan.....	45	73	18	4.22
Bolivar.....	Hardeman.....	E. P. McNeill.....	48	72	20	5.03
Savannah.....	Hardin.....	H. R. Hinkle.....	42	74	22	3.80
Waverly.....	Humphreys.....	D. V. Owen.....	44	67	18	2.04
Knoxville.....	Knox.....	Prof. J. W. Glen.....				3.48
Howell.....	Lincoln.....	O. R. Hatcher.....				3.90
Hardison's Mills.....	Maury.....	Calvin Hardison.....	48	72	27	2.75
Chickaluck.....	McMinn.....	Jacob Zeigler.....				6.00
McNairy.....	McNairy.....	J. H. Blakely.....	49.2	76	24	3.45
Sailors' Rest.....	Montgomery.....	John Minor.....				3.25
Benton.....	Polk.....	James Hood.....	45	79	19	4.00
Florence Station.....	Rutherford.....	Charles F. Vanderford.....	46	74	24	3.36
Grand View.....	Rhea.....	Hattie R. Stratton.....	51	73	39	0.26
Woodstock.....	Shelby.....	S. Hammonter.....	47	74	22	3.77
Alexandria.....	De Kalb.....	Irene Beckwith.....	46	65	30	4.60
Covington.....	Tipton.....	T. W. Boone.....	46	70	26	6.01
Manchester.....	Coffee.....	Wiley Hickerson.....	44	69	22	5.00

The following meteorological summary has been forwarded by Mr. S. R. Thompson, Director of the "Nebraska Weather Service."

BULLETIN FOR MARCH, 1883.

The month was cold, with rainfall and atmospheric humidity less than usual.

Rainfall.—The average by sections was as follows: Southeast, 0.48; southwest, 0.27; northeast, 0.80; northwest, 0.55. Average for entire state, 0.60.

Relative Humidity.—Omaha, max., 86.1; min., 44.0; mean, 64.1.

North Platte, mean, 64.8.

De Soto, max., 29.32; min., 28.2; mean, 28.79.

College Farm, mean, 69.00.

Temperature.—The mean temperature of the air was 35.38. The average of all noon observations was 43.73.

The following were some of the maximum and minimum temperatures:

Omaha, max., 71.0°; min., 3.0°. De Soto, max., 69.0°; min., 21.0°. College Farm, max., 71.0°; min., 6.0°. North Platte, max., 71.3°; min., 12.0°.

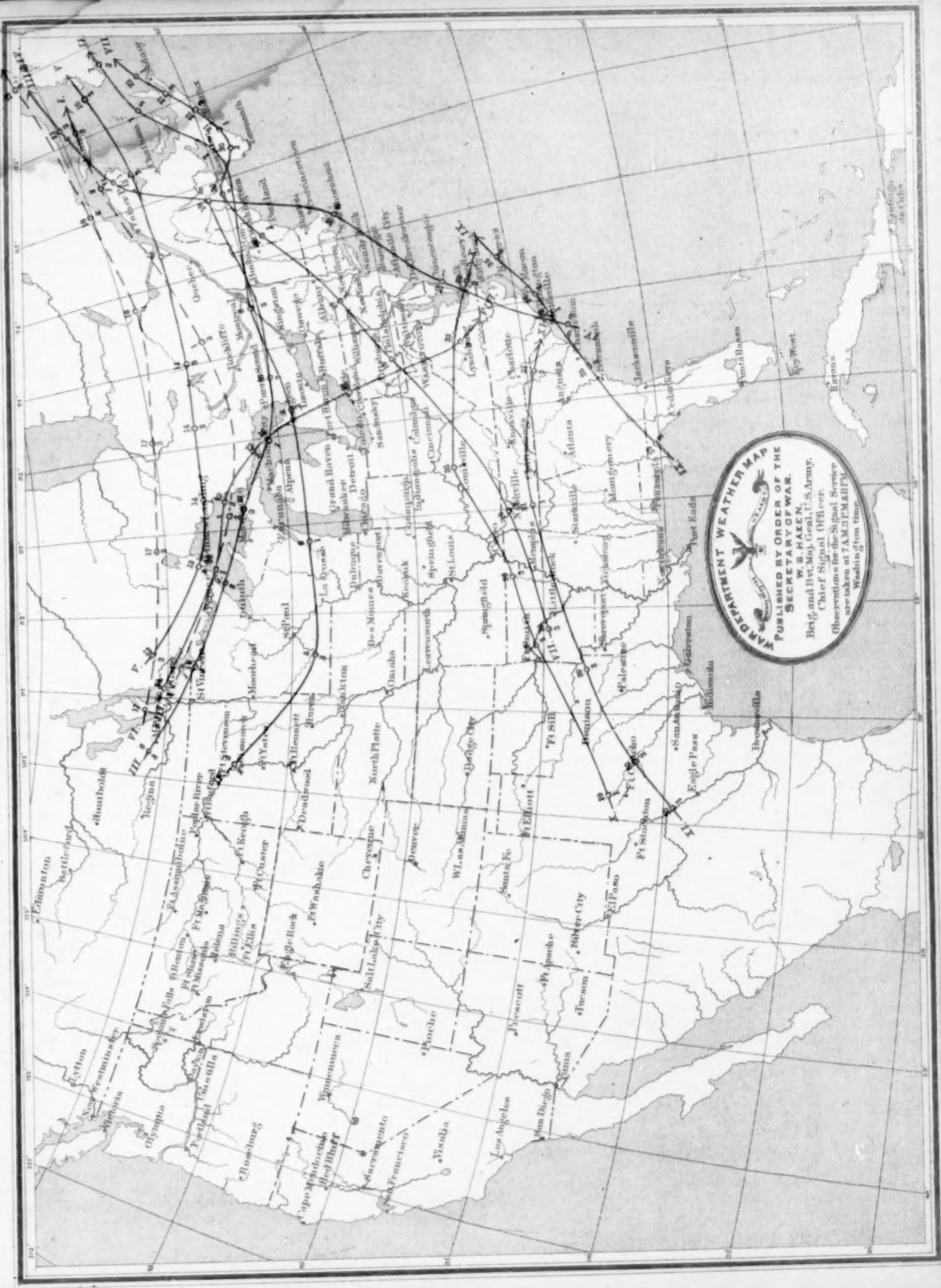
Wind.—Miles travelled, Omaha, 6,465; North Platte, 6,980. Prevailing direction, Omaha, north; North Platte, northwest; College Farm, north. Greatest velocity at Omaha, was 22 miles, north and northwest; at North Platte, 34, west.

Miscellaneous.—Larks were seen at Beaver Creek on the 1st, at Sutton on the 6th, at Superior on the 11th, at Minden on the 12th, and at Geneva on the 19th. Blue birds were seen at Crete on the 2d. Robins are reported on the 1st at Nebraska City, the 7th at Crete, and 12th at Beaver Creek. Wild geese flying south were observed at Crete on the 12th, and at Sutton on the 13th. There was a dust storm at Crete on the 18th. During the middle and latter part of the month, there were several light snowfalls all over the state. The spring is very late, and thus far has proved very unpropitious to the farming interests. Dr. Clark, of Sutton, writes that the spring is more backward than it has been for twelve years.

ERRATUM.

On page 48, of the February REVIEW, under the heading "Atmospheric electricity interfering with telegraphic communication, &c.," in the report of Captain Vogelgesang, the aberration of the compass should be 2½ points, instead of 22½ points as published.

Chart I. Tracks of Low-Barometer Areas, March, 1883.



DEPARTMENT WEATHER MAP
 PUBLISHED BY ORDER OF THE
 SECRETARY OF WAR.
 W. B. HAKEN,
 Brig. and Bvt. Maj. Genl. U. S. Army,
 Chief Signal Officer.
 Observations for the Signal Service
 are taken at 7 A.M. & 3 P.M. & 11 P.M.
 Washington time.

1933
March
1933

Chart II. Ocean Storm Tracks, March, 1883.

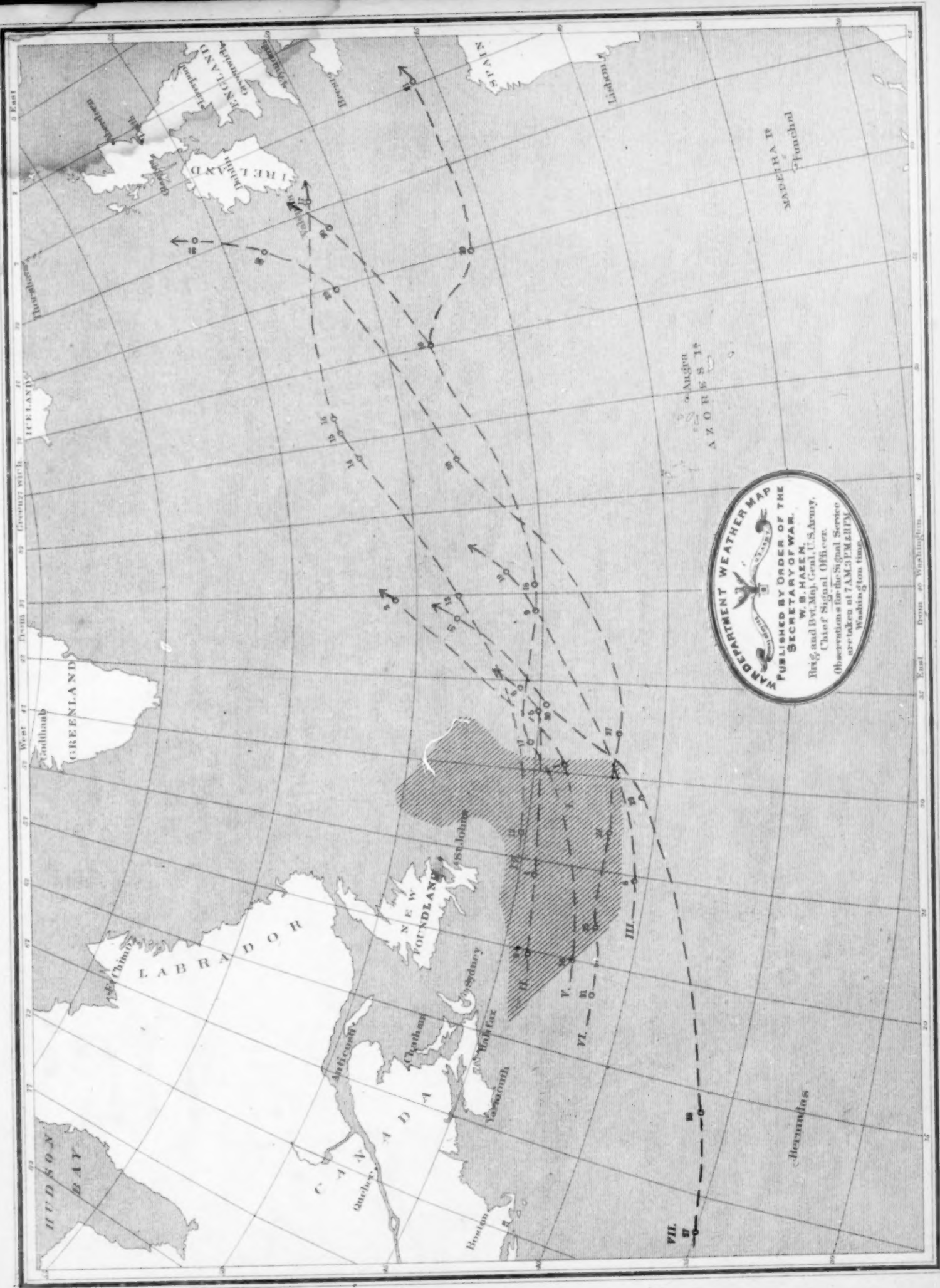


Chart III. Isobars, Isotherms, and Winds. March, 1883.

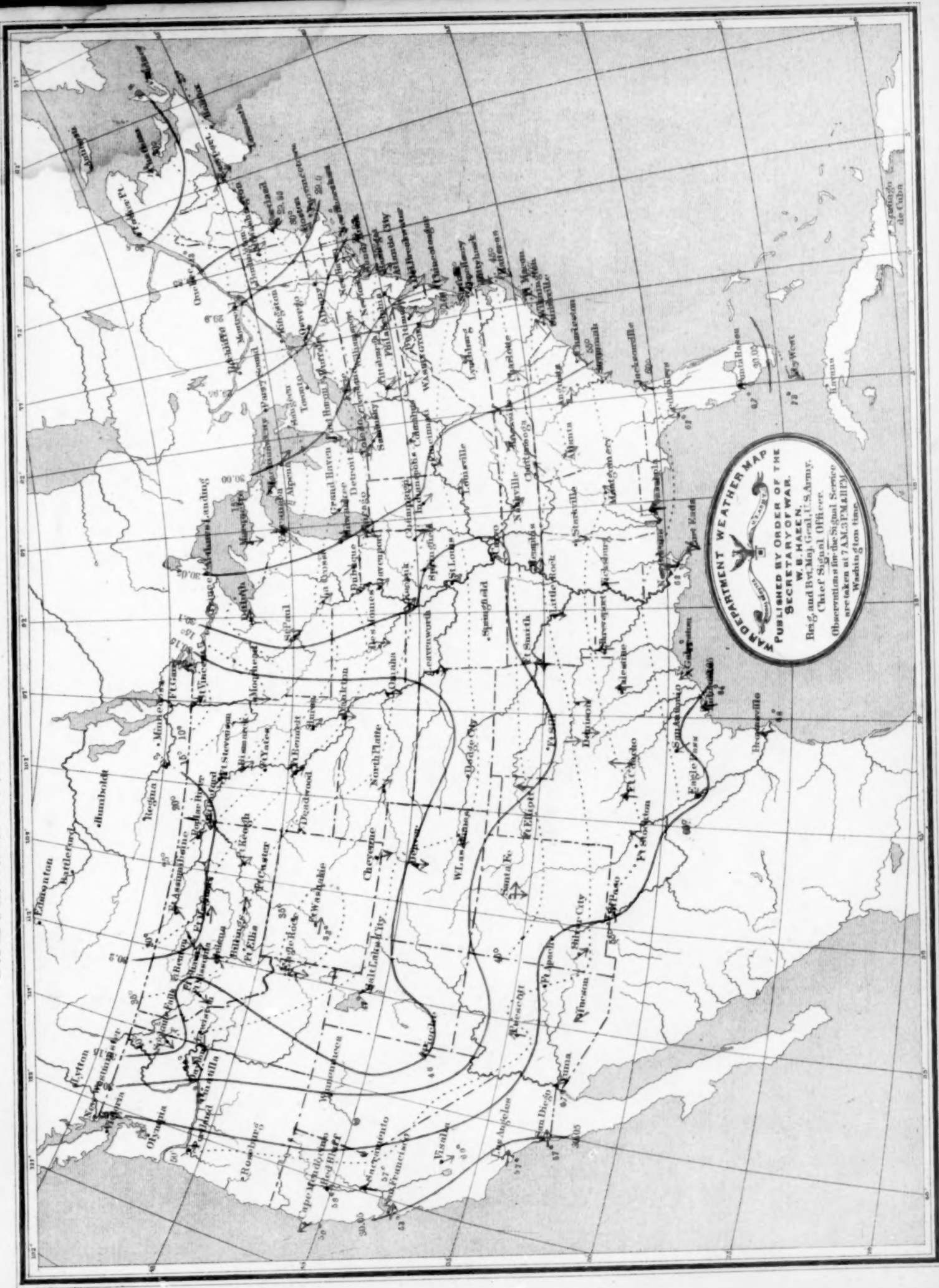


Chart IV. Precipitation, March, 1883.

